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Note.—Initial reviews are written by the following:

Mr G. E. Dixon	G. E. D.
Mrs M. Thomas	M.T.
Dr J. Wishart	J. W.

* General studies, see also individual crops.

Plant Breeding Abstracts

Vol. XXI, No. 4

*STATISTICS

2287. CLEM, M. A. and
FEDERER, W. T.

Random arrangements for lattice designs.

Spec. Rep. Ia St. Coll. Agric. Exp. Sta. 1950 : No. 5 : Pp. 151.

Randomizations are presented for lattice designs where $k = 5, 7, 8, 9, 11$ and 13 .

2288. EHRENBERG, P.

Zur Beurteilung der Zuverlässigkeit unserer Versuchsergebnisse. (On
judging the validity of our experimental results).

Landw. Jb. Bayern 1950 : 27 : No. 5/6 : 69-84.

The design and analysis of several agricultural experiments are critically discussed. In particular, stricter account should be taken of the inherent variability of the results.

2289. KRISHNASWAMI AYYANGAR, A. A.

A historical note on a theorem in incomplete block designs.

Curr. Sci. 1951 : 20 : 93-94.

A matrix method is outlined for establishing the theorem concerning incomplete block designs that a necessary condition for a cyclic solution to exist is that $(r-\gamma)$ should be a perfect square when v is even.

2290. LI, J. C. R.

(Design and statistical analysis of some confounded factorial experiments).

Taiwan Sug. J. 1949 : 2 (1) : 158-84. [Chinese].

A Chinese translation is given of the article summarized in *Plant Breeding Abstracts*, Vol. XV, Abst. 869.

2291. LI, J. C. R. and

KELLER, K. R.

An application of serial correlation in field experiments.

Agron. J. 1951 : 43 : 201-03.

The use of serial correlation coefficients for ascertaining trends in soil fertility in uniformity trials is suggested, and an example of their application to a uniformity trial of hops is given.

*GENETICS

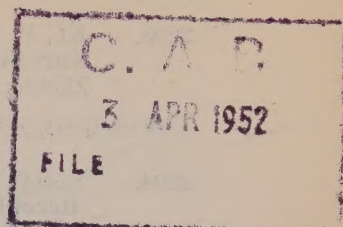
2292. SAKAI, K.

(The theory and practice of the Ramsch breeding method).

Agric. & Hort., Japan 1949 : 24 : 105-10. [Japanese].

An account is given of the theoretical principles underlying bulk breeding methods. Examples are quoted of its application in Germany and the USA to the improvement of wheat.

* General studies, see also individual crops.



2293. KL, M.
Kurt Störmer†.
Züchter 1950 : 20 : 311-12.

This obituary notice of K. Störmer recalls in particular his breeding work with the potato.

2294. KOMAI, T.
(Recent advances in genetics).
Jap. J. Genet. 1943 : 19 : 154-60. [Japanese].

The topics treated in this review are polyploidy, salivary chromosomes, mosaicism, physiological genetics, evolutionary genetics and the genetics of man.

2295.
The future belongs to Michurin.
Soviet News 1951 : No. 2547 : p. 1.
Farming in the Michurin way.
Ibid. 1951 : No. 2547 : 1-2.

Miçurin's achievements and the application of the principles of Miçurin in present day agriculture in the USSR are briefly described. Reference is made to the increased yields obtained by using the hybrid cereal varieties developed at the Lysenko All-Union Selection-Genetics Institute, the work of A. Avakyan [A. Avakjan] on developmental processes and their relation to heredity, and to O. Lepeshinskaya [O. Lepešinskaja] who is stated to have proved that not only the cell but noncellular living material can be a source for the development of living matter.

2296. MAGONE, JA. [J.].
(The report of the Presidium of the Academy of Sciences of the Latvian SSR for the period 1946-1950).
Latv. PSR Zinātņu Akad. Vēstis 1950 : 7 (36) : 179-83. [Russian].

In September 1948 the Latvian Academy of Sciences approved Lysenko's report to the Lenin Agricultural Academy (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2000) and resolved that the future research programmes should conform with the principles of Miçurinite agrobiolgy.

2297. TANATIN, B.
(The question of the syllabus on Darwinism).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :
p. 78. [Russian].

Several suggestions for the implementation and improvement of the syllabus revised by Prezent (cf. Abst. 1471) are put forward.

2298. SÁNCHEZ-MONGE, E.
Glosario de términos de genética y citogenética. Nuevos términos y usos. I. **(Glossary of genetical and cytogenetical terms. New terms and applications. I).**
An. Estac. Exp. Aula Dei 1951 : 2 : 211-13.

Spanish equivalents of recently introduced genetical terms are introduced and defined.

2299. JAKUBCINER, M. M.
(In commemoration of M. G. Tumanjan).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :
p. 79. [Russian].

An obituary of the late Soviet agrobiologist includes references to his research with wheat and other cereals upon which breeding work in Armenia is based.

2300. GUSTAFSSON, Å.
Marxist genetics at the Stockholm Botanical Congress.
 J. Hered. 1951 : 42 : 55-59.

The principles and practical achievements of Mendelian and Soviet genetics are discussed, against the background of the visit of the Russian delegates Soukatchev [Sukačev], Henkel [Genkelj], Glutschenko [Gluščenko], Baranov, Suchov [Suhov], Turbin and Stoletov to the Botanical Congress held at Stockholm in 1950.

2301.
Symposium on radiation genetics.
 J. Cell. Comp. Physiol. 1950 : 35 : Suppl. 1 : Pp. 210.

Three of the contributions have already been summarized: Some present problems in the genetic effects of radiation, by H. J. Muller (cf. Abst. 1568); the effects of X-rays on chromosome structure, by K. Sax (cf. Abst. 1563); and Discussion on population genetics and radiation, by S. Wright (cf. Abst. 1494). The substance of four other contributions has already appeared in other publications: Chromosomal interchanges induced in *Tradescantia* microspores by fast neutrons from uranium fission, by N. H. Giles (Jun.) and A. D. Conger (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2088 and Vol. XXI, Abst. 83); Cytological and phenotypical effects induced in maize by X-rays and the Bikini Test Able atomic bomb, by L. F. Randolph (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2068); The effect of radiations on genetic mechanisms of *Paramecium aurelia*, by R. F. Kimball (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2043); and Inactivation of enzyme-substrate film by small doses of X-rays, by D. Mazia and G. Blumenthal (cf. Abst. 98).

Carlson, J. G. *Effects of radiation on mitosis.* (pp. 89-101).

The results of experiments on grasshopper embryos to investigate the effects of radiation upon mitosis and the relative effectiveness of different dosage rates in altering the rate of mitosis are presented. It is pointed out that the mechanisms by which stimulation and ionization of the atom due to radiation are transformed into large scale mitotic effects are not yet understood. Recent demonstrations of the effectiveness of very low doses of ionizing radiations in interfering with enzyme actions are considered to have significant bearing upon this fundamental problem.

Tatum, E. L. *Effects of radiation on fungi.* (pp. 119-31).

Mutations of *Neurospora* induced by X-rays and ultraviolet light are compared with those resulting from treatment with nitrogen and sulphur mustards. The data so far obtained suggest that mutation in *Neurospora* is in general dependent upon the inherent properties of the gene rather than the nature of the mutagen. Cytoplasmically controlled mutation occurs rarely. At present, the evidence points only to the possibility of quantitative, rather than qualitative, specificity in mutagenic activity of different agents in fungi and bacteria. Genes may however differ in susceptibility to particular agents; if this is true, mutagens with a high degree of genic specificity may ultimately be discovered.

Wyss, O., *Some effects of ultraviolet irradiation on micro-*
 Haas, F., *organisms.* (pp. 113-40).
 Clark, J. B. and
 Stone, W. S.

From experiments on mutation of bacteria when grown in broths which had been irradiated with ultraviolet light or broths to which hydrogen peroxide had been added, evidence has been obtained that the compounds resulting from the reaction of peroxide and some broth components are responsible for the increased mutation rate recorded (cf. Abst. 117). Since peroxide is produced in bacterial respiration it may account for some of the so-called spontaneous mutations.

Other experiments have shown that increased dosage of radiation results in increased frequency of filamentous forms and prototrophs until a maximum is reached, after which

the frequency levels off and then declines; there appears to be some connexion between the abnormal growth phenomena and recombination.

Plough, H. H. *Radiation induced mutations in chemical requirements in Salmonella typhimurium.* (pp. 141-55).

Five classes of mutants of *S. typhimurium* induced by ultraviolet light or X-rays are described, consisting of (1) change from smooth to rough growth pattern, (2) loss of an essential synthesizing enzyme, (3) specific inhibition to growth in the presence of particular aminoacids, (4) change in capacity to utilize various organic compounds as sources of carbon, and (5) alteration in antigenic properties. The first four types occur at different levels of frequencies which appear to correspond with the levels of frequency of spontaneous mutation for these classes; it is pointed out that the evidence from *Drosophila* and other organisms indicates that radiation simply multiplies the natural mutation rate.

Muller, H. J. *Partial dominance in relation to the need for studying induced mutations individually.* (pp. 205-10).

The existence of a significant amount of dominance possessed by apparently recessive mutant genes and the relation of this phenomenon to the problem of methods to be used in determining the genetic effects of radiation upon populations are discussed, mainly with reference to *Drosophila*.

2302. LEVAN, A. and
 MÜNTZING, A.
 Correction of a report.
 Hereditas, Lund 1951 : 37 : 293-305.

A report published in the *Tägliche Rundschau* on 15 September, 1950 by I. E. Gluchchenko [Gluščenko], concerning the seventh International Botanical Congress in Stockholm is criticized.

Gluščenko's statement, which is reprinted as an appendix to this paper, contains a brief recapitulation of some of the familiar principles of Mičurinite genetics (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2000), including the importance attached by Soviet scientists to immediate practical results rather than theoretical achievements. Formal genetics, but not the existence of the chromosomes which can be observed under the microscope, is rejected. Inbreeding and induction of mutations by colchicine or other artificial means are regarded as less reliable breeding methods than directed training and hybridization, and as being associated with the reactionary formal genetics which is scorned by Mičurinite science.

Reference is made to experiments with clones of a winter rye which showed remarkable changes as a result of directed training upon different soils.

The following points are taken from the reply to Gluščenko's charges:—

The attention of the world's cytologists and geneticists to-day is centred on such problems as the induction of changes in the genetic constitution, including colchicine induced polyploidy. Mention is made of X-ray induced mutations in barley and colchicine-induced tetraploids of red clover, alsike clover and rye, obtained at Svalöf. These plants are viable and have practical value. Several tetraploid clovers and a rye are being propagated on a large scale and will be released for practical agriculture in the near future. The classical breeding methods are still most important. They imply selection and recombination within the existing genetic material. The experimental evidence produced by Nilsson-Ehle, based upon the discoveries of Mendel, has shown that many economic characters are governed by polymeric genes. It is possible to combine certain valuable genes and in that way to produce new improved varieties. The present writers admit that types with desired characters can be obtained by directed training. The successes of Soviet breeders are attributed to hybridization, because many genic recombinations, which are the prerequisite for a genic adaptation to different environments, occur in hybrid material. Western science attaches importance to the interaction between recombination and

environment. Reference is made to inbred lines of rye used for the production of highly fertile and vigorous rye-wheat hybrids. Some of the *Triticale* types at Svalöf represent a real synthesis of wheat and rye. Their nuclei contain the sum total of the chromosomes of the parental species, since their somatic chromosome complement of 56 chromosomes consists of 42 wheat and 14 rye chromosomes. They are constant types with good fertility.

2303. KARAPETJAN, V. K.

(Soft wheats obtained experimentally from hard wheats).

Trudy Inst. Genetiki (Proc. Inst. Genetics) 1950 : No. 17 : 32-95.

[Russian].

In experiments conducted at the Institute of Genetics of the USSR Academy of Sciences during the period 1944 to 1948, the hard wheats *Hordeiforme* 010 and *Melanopus* 069 were changed into *Triticum vulgare*. The method by which directed changes were obtained consisted of sowing the hard spring wheats in autumn for several years in succession.

T. vulgare forms obtained from *Hordeiforme* 010 comprised var. *ferrugineum*, *multurum*, *erythrospermum*, *cinereum*, *lutescens* and *caesium*, and those from changed *Melanopus* 069 included vars. *lutescens*, *multurum*, *cinereum* and *erythrospermum*. The results are regarded as proof of the Mičurinite thesis that changes in inheritance are caused by changes in the metabolic processes within the organisms. Changed external conditions result in changes of the cellular tissues in plants which lead to accumulated changes in the seed. In the present experiments the biological and morphological properties of hard spring wheats underwent complete changes. The soft wheats obtained by directed training segregated in later generations within families from a single ear. For instance, in plants 7 and 17, derived from *Melanopus* 069, and plants 29, 31, 40, 52 and 53, obtained from *Hordeiforme* 010, awnless forms came from awned wheats and bearded wheats from awnless.

The experiments support Lysenko's theory that hard wheats can be changed into soft wheats by planting spring wheats in autumn for several years, and that the hard wheat character is incompatible with the winter habit. Of the 117 samples of hard wheat changed into soft wheats, plant 42, a *caesium* form derived from *Hordeiforme* 010, changed again into hard wheat when planted in autumn in 1947.

When changing into soft wheat, hard wheat acquires all the properties of *T. vulgare* including its chromosome number. No intermediate forms between the *durum* and *vulgare* wheats were observed.

2304. MENDEL, G.

Versuche über Pflanzen-Hybriden. (Experiments in plant hybridization).

J. Hered. 1951 : 42 : 3-47.

A facsimile is presented of Mendel's classical paper on the genetics of the pea.

2305. DIONIGI, A.

Vecchi e nuovi principii per la genetica agraria. (Old and new principles for agricultural genetics).

Ann. Fac. Agr., Perugia 1947 : 4 : 191-209.

On the basis of ten years' experience of the work of Strampelli, followed by his own study of many hundreds of crosses, the author has reached the conclusion that in the majority of cases and for the most important agricultural characters the Mendelian laws are no more than rough generalizations, and that plant breeding methods are still purely empirical. This criticism applies equally to the established methods and to new methods such as the induction of mutations, which occur entirely at random, and Lysenko's system, which is described as an irrational complex of heterogeneous rules unified only by his contempt of anyone else's conceptions.

The author sees the effects of heredity and of environment on the organism as expressions of a single whole, a stable equilibrium; adaptation is thus only the process of attaining this equilibrium. A character is "an objective difference revealed to the consciousness by a comparison," and since the number of comparisons it is possible to make is infinite, the number of characters is infinite too. The concept of a particulate gene is thus absurd. Our senses perceive only the end results of variations in the complex equilibrium. In nature certain factors vary rhythmically, e.g. temperature, humidity, fungal attack. The task of the plant breeder is to select individuals whose developmental rhythm best conforms to the rhythm of nature and enables them to escape the effects of adverse factors such as cold, fungus and drought.

2306. MATHUR, P. N.
Effective number of genes.
 Curr. Sci. 1950 : 19 : p. 384.

The number of genes responsible for a quantitative character, assuming that the distribution of their dominance effect (h_a) is symmetrical, is given by the formula:—

$$k = \frac{3}{2} \frac{BH}{G} \left(1 - \left[1 \pm \frac{8BG}{9H^2} \right]^{\frac{1}{2}} \right)$$

where k is the number of genes; B , the total dominance ($S[h_a]$); H , the unfixed variance ($S[h_a^2]$); and G denotes ($S[h_a^3]$).

2307. HARTE, C.
 Dominanzwechsel bei *Oenothera* als genetisches und entwicklungsphysiologisches Problem. (**Changes of dominance in *Oenothera* as a problem in genetics and developmental physiology**).
 Z. indukt. Abstamm.- u. VererbLehre 1950 : 83 : 318–23.

The *velans* complex of *Oe. Lamarckiana* contains a gene for falcate leaves, the expression of which varies greatly in the heterozygotes. Several possible explanations of variable dominance are discussed; one of them is that a certain concentration of enzyme is required to produce a given character and that this is influenced by environmental factors as well as by the dose of the gene.

2308. MATSUURA, H.
(The chromosomal basis of crossing over).
 Jap. J. Genet. 1943 : 19 : 139–53. [Japanese].

In this general review of the mechanism of chiasma formation and crossing over, the author compares the chiasmatype theory with the neo-two-plane theory (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1596).

2309. ASHBY, E.
Hybrid vigour in plants.
 Mem. Manch. Lit. Phil. Soc. 1949–50 : 91 : 1–18.

A critical survey of the causes of hybrid vigour is presented, including both genetical and physiological analyses.

From numerous examples of hybrid vigour it is concluded that genetical causes may be the combination of dominant genes in the hybrid which are favourable for growth, and the interaction of genes in the heterozygous state. The physiological mechanisms most probably responsible for the increased size of hybrids are higher growth rates in embryos and young seedlings, and prolonged growth of hybrids when the parents have ceased growing.

The practical value of hybrid vigour in various crops and forest trees is briefly summarized.

2310. LOH, S. Y.

Early testing as a means of evaluating F_1 heterosis between inbred lines of *Drosophila melanogaster*.

Iowa St. Coll. J. Sci. 1951 : 25 : 280-82.

Significant differences in combining ability, as shown by egg production, were found among inbred strains crossed to a synthetic stock derived from eight inbred lines. The data suggested that a large number of genes with small additive effects were responsible for the variation in egg production of the hybrids. The degree of heterosis exhibited by crosses between inbred lines increased with the generation of inbreeding from the fifteenth, twenty-fourth and thirty-fourth generations. The inbreds showed lowered vigour and productiveness as inbreeding advanced but their loss in vigour was not detrimental to the egg production of the hybrids obtained from them. This agrees with the assumption that crossing contributes alleles which overcome the effect of detrimental homozygous recessives by the dominant condition, or that it contributes beneficial effects due to heterozygosity. Within synthetic x inbred crosses, the uncontrolled variations contributed most of the variations in egg production; and they showed a decreasing trend with increased inbreeding. Within inbred lines, after 20 generations of brother x sister matings, the uncontrolled variances were similar in successive generations. The performance of lines which had been subjected to 20 generations of inbreeding was a better index of future performance in hybrid combination than their performance in top cross tests.

2311. SERRA, J. A.

Une théorie du gène, de l'effet de position et de la mutation génique.

(A theory of the gene, of position effect and of genic mutation).

Genetica Iberica, Madrid 1950 : 2 : 113-38.

The gene is envisaged as a phenogenetic unit, residing in the chromonema and primarily influencing a single link in a chain of reactions; it corresponds to a single chromomere or part of it but more often than not embraces several salivary bands; there is a minimum segment of the chromomere which can rupture and this is called the nemamere, several of which comprise the gene, which is made up of a large number of polypeptide chains; the relatively small amount of energy required to break the chromonema indicates that the chains are not continuous, as the chromosome-molecule school envisage them, but in loosely linked blocks or segments. The polypeptides constituting the gene form the model for the synthesis of enzymes; transformations of their composition or structure within the gene will give rise to gene mutations, which by further rearrangement restoring the *status quo* can give reverse mutations.

2312. YAMAGUTI [YAMAGUCHI], Y.

(Conceptions of gene structure).

Jap. J. Genet. 1944 : 20 : 94-100. [Japanese].

The topics covered in this review are irradiation studies, protein structure, cellular enzymes, and the properties and structure of the individual gene.

2313. MICHAELIS, P.

Grundzüge der intraindividuellen Plasmon-Umkombination. (Basic characteristics of intraindividual plasmon recombination).

Protoplasma 1950 : 39 : 260-74.

Hybrids from various *Epilobium* crosses, especially *E. hirsutum* x *E. parviflorum*, exhibit great differences between the reciprocal crosses and these reciprocal crosses later show secondary variations. Thus, the cross with *E. parviflorum* develops normally, whereas the reciprocal cross, particularly when cytoplasm of the Jena or Essen races of *E. hirsutum* is involved, is a dwarf plant which normally does not flower. Later such dwarf plants show many shoots in which the growth disturbances are far less marked and as a result the dwarf growth is soon counteracted. Study of over 1300 such secondary changes has

proved that these variants are due to changes in the cytoplasmic heritable material; they always lead from stronger to weaker inhibitory disturbance, i.e. they are directed towards counteraction of the developmental disturbance. On subjecting the above mentioned dwarf to low temperature and short day treatment it becomes modified so that the plant flowers, is no longer distinguishable from the reciprocal cross, and is exactly like the heritable variation *adaequatum*; the modification, heritable variation and reciprocal cross can only be distinguished by their vegetative and generative progeny.

From investigation of chimeras, especially in cases where the individual leaf is formed of differently composed tissue, the author draws conclusions concerning the actual material which underlies characters inherited through the cytoplasm. The ways in which cells with different cytoplasmic hereditary material may originate are explained and the possible modes of influencing transformation of the plasmon due to recombination are summarized. The constancy of inheritance in variations arising from such recombinations is also discussed.

2314. SONNEBORN, T. M.

The role of cytoplasm in heredity.

Amer. Ass. Advanc. Sci. Centennial Celebration Sept. 13-17, 1948 (1950) : 234-47.

Evidence obtained from the study of the guinea pig, rabbit and *Paramecium* is presented to substantiate the hypothesis that cytoplasm, in addition to the genes, determines the inheritance of certain characters. The mechanism by which cytoplasmic inheritance is controlled and its relationship to gene action are considered (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1334). It is suggested that: (1) control may be independent of genes and is influenced by organisms living in the cytoplasm; (2) there may be a system of inhibitory interaction among cytoplasmic products of gene activity; or (3) a state of competition may exist among gene initiated plasmagenes.

2315. MICHAELIS, P. and
KAPLAN, R. W.

Manifestationswechsel beim Zusammenwirken chromosomaler und plasmatischer Erbfaktoren. (**Changes in the manifestation of the interaction between chromosomal and plasmatic hereditary factors**).

Naturwissenschaften 1950 : 21 : p. 494.

Studies are reported on the expression of X-ray induced mutants of *Epilobium parviflorum* in different plasmas. It was found that the dominance relations, intensity of expression and type of effect of the mutant genes were all liable to be affected by the plasma.

2316. FISHER, R. A.

Gene frequencies in a cline determined by selection and diffusion.

Biometrics 1950 : 6 : 353-61.

The case of an advantageous gene advancing along a linear habitat under constant selective advantage was discussed by the author in 1937. In nature the advantage often varies with position, being positive in one part of the habitat and negative in another, with a neutral boundary between. This leads to a cline, with a gradient in the frequencies of genotypes. The present paper ignores the purely genetic complications of the non-recognition of a genotype chiefly because the occurrence of true dominance suggests (1) the existence of a balanced polymorphism, and (2) that more careful examination may make heterozygotes recognizable with a consequent increase of information.

The problem under consideration is of course distinct from the discussion by Haldane in 1948 of the effects of a discontinuous selection intensity acting on a gene ratio obscured by dominance.

Available data will normally be gene frequencies observed at chosen centres of collection. The main object is to determine the neutral or 50% line, and the distances from it at which

other percentages occur. The scale is important and depends on the ratio of the diffusional coefficient for the species and the intensity of the selective gradient.

Suppose $p = 1 - q$ is the gene frequency at points whose distance is x from the neutral line. Then, using an appropriate unit of length for x , it is shown, by analogy with the usual process of physical diffusion, that the cline is characterized by the differential equation $d^2q/dx^2 = 4xpq$, subject to the boundary conditions $x = 0, q = \frac{1}{2}$ and $x = \infty, q = 0$. Tables of the solution of this equation are given. The procedure for the maximum likelihood determination of the scale and the position of the neutral line is then described. This is most conveniently appreciated by analogy with the use of probit analysis in toxicology, the corresponding deviates in the present case being termed legits. Tables appropriate to the fitting of actual data are also given, and the necessary computations are outlined.

2317. SCHNACK, B. and
COVAS, G.

Una fórmula de aplicación para la genética de poblaciones. (**A formula applicable to the genetics of populations**).
Ciencia e Investigación, B. Aires 1951 : 7 : p. 187.

A new formula is given for calculating the proportion of recessive phenotypes in annual or monocarpic plants in any generation descended from an original population of heterozygotes, in the absence of selection pressure, for any degree of cross pollination.

2318. KAPLAN, R. W.

Zur Kritik an der Deutung linearer Dosis-Effekt-Kurven in der Strahlenbiologie als Eintrefferfunktionen. (**Concerning the criticism of the interpretation of the linear dose/effect curves in radiation biology as single-hit functions**).

Naturwissenschaften 1951 : 38 : 120-21.

The curve for mutation rate against dosage is shown once more to conform to the formula for a single-hit effect rather than to that for the cumulative effect of ionization as suggested by Opatowski (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1342).

2319. GATES, R. R.

Another parallel mutation in *Oenothera*.

Canad. Field Nat. 1950 : 65 : 142-45.

The new species *Oe. perangusta* and its variety *rubricalyx* are described; the new variety is considered to be a wild mutant parallel to the mutant *Oe. rubricalyx*, reported by the author in 1911 and found among cultures of *Oe. rubrinervis*; the mutant *Oe. rubricalyx* depended upon a single dominant factor.

2320. DERMEN, H.

Pattern reversal in variegated plants.

J. Hered. 1951 : 41 : 325-28.

Leaf variegation in *Euphorbia pulcherrima* and *Ligustrum vulgare* is described which appears to be histogenetic in origin, confined to one of the three histogenic layers and to tissue derived from the layer in question (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 68). This type of variegation is distinguished from variegation of genetic or virus origin. Histogenetic variegation occurs somatically during plant growth and is caused by mutation in one of the meristematic layers. In the particular type of variegation described, the entire plastid system is affected and the chloroplasts do not develop normally in the affected tissue.

2321. SEN, N. K.
Mutagenic chemicals.
 Sci. and Cult. 1951 : 16 : 480-81.

A brief review is given of recent work on chemically induced mutation.

2322. SIRKS, M. J.
 Sobre los genes "inestables". (On "unstable" genes).
 Genetica Iberica, Madrid 1950 : 2 : 109-11.

Plants of *Delphinium Ajacis* with variegated flowers do not breed true. They produce in the next generation individuals with pink flowers, purple flowers and variegated flowers, the two former types either breeding true in some cases or segregating further in others. In the light of these observations, the author questions whether the variegation observed in the flowers of this species is due to an unstable gene; somatic segregation is considered a more likely explanation.

2323. BUZZATI-TRAVERSO, A.
 Prolificità e selezione. (**Prolificity and selection**).
 Genetica Iberica, Madrid 1950 : 2 : 175-84.

Experiments with *Drosophila* are described to illustrate that the number of fertile offspring is the real criterion of the selective advantage of any genotype within a species. At the interspecific and higher levels other principles, particularly differential mortality and the struggle for existence in the Darwinian sense, are operative.

EVOLUTION

2324. SMALL, J.
Quantitative evolution. XVIII. Revision of numerical data for diatom durations and numbers.
 Proc. R. Irish Acad. 1950 : 53 : 241-63.

The preliminary revision of numerical data (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1390), illustrating the relations between generic size and species duration, has been completed. Many expectations based on the duration of *p* and *e* species (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1393) have been confirmed. The dispersal of new species over a large number of genera, listed in detail, produces few numerically significant changes; those which are of significance include the extension of generic histories into the Cretaceous and an increase in the number of species of Cretaceous genera.

2325. **A discussion of time-rates in evolution.**
 Proc. Linn. Soc. Lond. 1951 : 162 : 124-47.

Zeuner, F. E. *Time-rates in organic evolution.* (pp. 124-30).

Curves based upon data on the number of species existing in successive stratigraphical divisions and upon cases in which the rate of speciation exceeds rate of species extinction usually show the phases of initial lag, "explosive" increase, stability and decline. Work done so far on evolutionary time rates of animal organisms suggests that (1) rates of production of new systematic units vary but phases of abundant production are limited in duration to a few tens of millions of years; and (2) the rate of speciation varies but is rarely less than a few hundred thousand years.

Small, J. *Discussion on time-rates in evolution.* (pp. 130-34).

In studying the diatoms, the author has found little evidence of any gradual evolutionary changes; species and higher categories appear to have arisen mainly by one-step mutations, a process favoured by the predominance of uniparental multiplication.

*Schindewolf, O. H. Geologische Zeit und organische Entwicklung.
(Geological time and organic evolution).
(pp. 134-47).*

The hypothesis that a phylogenetical cycle consists of typogenesis, typostasis and typolysis is discussed (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 832). The onset of typogenesis is believed to be due to the occurrence of mutations with an unusually large effect.

General discussion. (pp. 141-47).

R. Ross criticizes the work of Small on the evolution of the diatoms, emphasizing that the information on the fossil history of these organisms is necessarily very limited and thus does not provide sufficient grounds for rejecting the neo-Darwinian theory of evolution.

2326. KLEČKA, A.
(**We have learned the secret of success of Soviet agricultural science**).
Interagra, Prague 1950 : 4 : 337-61. [Russian].

Some aspects of Mičurinite genetics are referred to. Mention is made of a rye grain found in a wheat ear and of a barley plant grown from a grain of a wheat plant. These were shown to the visitors at the Timirjazev Agricultural Academy by Lysenko, who attributed the change of one species into another to environmental influence. Lysenko mentioned Lepešinskaja's research (cf. Abst. 1509) which showed that cells arise not only by division. Breeding work with a highly productive branching soft wheat at Gorki Leninskie and elsewhere in the USSR is reported. The main objective is to obtain a branching winter wheat.

2327. KLEČKA, A.
Podstata druhů a vztahy mezidruhové. (**The new concept of species and interspecific relations**).
Věstn. Čsl. Akad. Zeměd. 1951 : 25 : 4-12.

Darwin's theory of natural selection and the origin of species is discussed from the Mičurinite viewpoint and the modern Soviet theories on interspecific and intraspecific relations and evolution are expounded. An instance of a cabbage changing into another unnamed species as a result of external conditions is listed with the more familiar Mičurinite examples of changes occurring in cereals. Reference is made to Lepešinskaja's research on the origin of cells other than by cellular division (cf. Abst. 1509).

2328.
(**The USSR conference on breeding and seed growing**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :
64-70. [Russian].

A report of the conference held on 26 June to 1 July 1950, at the USSR Ministry of Agriculture, includes references to Soviet breeding and seed growing with some of their agrobiological aspects. One of the papers read at the meeting was by Lysenko on the new concept of species in science.

2329. DVORJANKIN, F. A.
(**The syllabus on the course of Darwinism for agricultural higher technical schools**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 10 :
69-79. [Russian].

The new syllabus is introduced editorially as one officially approved by the Central Administration of Agricultural Higher Technical Schools of the USSR Ministry for Higher

Education. The introduction contains a reference to a criticism of Prezent's outmoded syllabus by T. I. Belaš and to a new syllabus prepared by Prezent, which were both published in *Selekcija i Semenovodstvo* (cf. Absts. 1467 and 1470-1). The readers are invited to send in any suggestions they may have for improvement of this syllabus.

2330. BAKER, H. G.

Evolutionary trends and classification.

Nature, Lond. 1951 : 167 : 921-23.

An account is given of the symposium on the above subject, held by the Systematic Association at Leeds in April, 1951. The contributions, most of which dealt with animal organisms, included Trends in the degree of diversification in diatoms, by J. Small, and The units of evolution and the units of classification, by J. M. Thoday. In the former paper, data on fossil diatoms were presented which were regarded as supporting the hypothesis of the role of mutation in speciation. In the latter paper, it was pointed out that the size and complexity of units of evolution vary according to the breeding system and thus cannot provide satisfactory units of classification.

2331. DIONIGI, A.

Le unità subspecifiche: concetto di "ecobiotipo". (**The subspecific units: the concept "ecobiotipo"**).

Ann. Fac. Agr., Perugia 1949 : 5 : 197-208.

Since mutation is continually inducing heterogeneity and can affect any character, and since the number of "characters" in an individual is infinite, the probability that any two individuals are genetically identical is vanishingly small and the concept "biotype" is considered void of any objective value; in the agricultural sense it can have only a relative meaning, of a group of individuals having no perceptible differences in their genetical constitution; or, what from an agricultural standpoint is most important, in yield. This group the author prefers to call an agricultural line, and it is the only one of the subdivisions of the species, such as pure line, élite line or pure breed, that is both conceivable and recognizable. Since the author considers organism and environment as two parts of a single whole (cf. Abst. 2305), he concludes that if individuals of a given line A remain for a long enough period in an environment conditioning a different developmental rhythm from that of other individuals, they will become distinct genetical entities in respect of this developmental rhythm, that is, distinct ecobiotypes. The ecobiotipo is a group of genetically related individuals presenting an identical developmental rhythm; these will be identical also in yield.

***CYTOLOGY**

2332.

(Resolution of the Presidium of the USSR Academy of Sciences of 7 June 1950).

Izv. Akad. Nauk. SSSR (News Acad. Sci. USSR) Ser. Biol. 1950 : No. 5 : 134-36. [Russian].

The Presidium has considered the report by A. I. Oparin on the conference concerned with the problems of cell origin and commends O. B. Lepešinskaja *et al.* (cf *Plant Breeding Abstracts*, Vol. XX, Abst. 1509) on their approach to cytological problems and the rejection by them of idealist Virchowian theories. Several Soviet cytologists and histologists, including academicians D. N. Nasonov and N. G. Hlopin, are criticized for their Virchowian and reactionary Weismannite negation of life in non-organized cells.

The Presidium resolves that:—

(1) The biological and chemical institutes of the USSR Academy of Sciences shall encourage the study of the problem of unorganized forms of life and evolution of cells, while at the

* General studies, see also individual crops.

same time conducting an unyielding struggle with Virchowism and other idealist trends in biology.

(2) The study of the problem shall be included in the scientific research programme for 1951 and the Five Year Plan.

(3) The Ministries for higher education and health shall be requested to revise all hand-books and lecture programmes in order to eliminate the remaining idealist errors in the concept of the cell.

(4) The USSR Society for Propagation of Political and Scientific Knowledge shall be requested to support the new theories on the origin of cells.

(5) The Presidium of the USSR Academy for Medical Sciences shall be asked to consider measures for expanding the research facilities of the Institute of Experimental Biology, led by Professor O. B. Lepešinskaja.

(6) The Publishers of the USSR Academy of Sciences shall be charged with the publication of scientific papers and popular scientific literature on the problems related to the study of life in unorganized cells and for criticism of Virchowian theories.

(7) Suggestions shall be made to the editorial boards of the biological journals of the academy that the adherents of Virchow be criticized in the factual field of biological research.

(8) The material on the conference referred to above shall be published as a symposium under the joint editorship of Oparin, Aničkov, Žukov-Verežnikov, Gluščenko and Hruščov.

2333. MAŁACZYŃSKA-SUCHCITZOWA, Z.
Za i przeciw teorii komórkowej. (**For and against the cell theory**).
Poznań. Tow. Przyjaciół Nauk Wydział Mat.-Przyrod. Prace Komis.
Biol. 1950 : **12**(2) : Pp. 56.

A historical review is given of the evidence for and against the cell theory from the time when it was first advanced up to recent times; its relation to the Gestalt theory, to recent work on bacteria and viruses, to Bertalanffy's theory of the organism and his theory of systems and to the problem of living matter is discussed. In the writer's opinion the importance of the cell as the main structural unit in the organization of living matter is not diminished by the discovery that life may exist outside this form.

2334. KAUFMANN, B. P.,
GAY, H. and
MCDONALD, M. R.
Enzymatic degradation of ribonucleoproteins.
Amer. J. Bot. 1951 : **38** : 268-75.

The results of cytochemical investigations using meristematic cells in the root tips of *Allium Cepa* and a triploid strain of *Lilium tigrinum* indicate that ribonucleic acid in fixed cells exists in the cytoplasm and the nucleolus in association with proteins rich in tryptophane, but in the chromosomes it is mainly associated with proteins of the histone type.

Purified crystalline ribonuclease was used in the degradation of the ribonucleoproteins, increasing the stainability of resulting proteins with acidic dyes.

2335. YASUI, K.
(**On the structure and development of the aleurone grains of the castor bean and the relationship between their development and the nucleus**).
Jap. J. Genet. 1946 : **21** : 28-29. [Japanese].

An extended version of this paper in English has been summarized in *Plant Breeding Abstracts*, Vol. XX, Abst. 748.

2336. MOSES, M. J.,
DuBOW, R. and
SPARROW, A. H.
**The effects of X-rays on desoxypentose nucleic acid *in situ*;
quantitative cytochemical studies on *Trillium*.**
Rep. US Atom. Energy Comm. AECU 1162 : p. 1 and Nuclear Sci.
Abstr. 1951 : 5 : Abst. 2649.

In experiments on *Trillium erectum*, X-ray treatment of buds caused no depolymerization of desoxypentose nucleic acid in the pollen mother cell nuclei, but appeared to result in increased stability of this nucleic acid.

2337. HOWARD, A. and
PELC, S. R.
Synthesis of nucleoprotein in bean root cells.
Nature, Lond. 1951 : 167 : 599-600.

The results of applying the autoradiograph technique to root cells of *Vicia Faba* have indicated that (1) P^{32} absorbed as $NaH_2P^{32}O_4$ is synthesized into a cellular compound during some part of interphase; (2) the compound is synthesized in cells which are preparing for division but not in cells which will differentiate without further division; (3) the compound remains in nuclei for considerable periods of time and is transmitted to daughter nuclei; and (4) S^{35} is incorporated into the cell during the same mitotic stage as P^{32} .

2338. HARADA, I.
(A sex chromosome in the genus *Phyllospadix*).
Jap. J. Genet. 1944 : 20 : 127-28. [Japanese].

In *Ph. japonica*, the female plant has 20 short chromosomes while the male has 15 short chromosomes and one large V-shaped chromosome, which, it is supposed, may pair with five of the short female chromosomes.

2339. LA COUR, L. F.
Heterochromatin and the organisation of nucleoli in plants.
Heredity 1951 : 5 : 37-50.

Using the technique of low temperature treatment, studies have been carried out on the mapping of heterochromatin in *Trillium* spp., *Fritillaria* spp., *Paris podophylla* and *Vicia Faba*. Cold treatment has been found ineffective as a means of locating the position of heterochromatin in one other species studied, viz. *Scilla sibirica*. In this species heterochromatin is readily distinguishable in the resting nuclei at prophase at the four-cell stage of the embryo sac. The effect of treatment with beryllium nitrate was studied in *S. sibirica*; a small proportion of the mitoses entered metaphase in a prophase condition, and in contrast to the incompletely coiled euchromatin the heterochromatin exhibited complete coiling.

Tetraploid species of *Trillium* and *Paris* possess less heterochromatin than diploids. In tetraploid *T. Tschonoskii*, 2 of the 4E chromosomes are heterozygous in respect of unspiralized heterochromatin. In *Fritillaria* three types of nucleolar organization have been discovered. Most of the Californian species of *Fritillaria* have considerably more heterochromatin than any of the Old World species analysed.

The results of the survey are discussed with reference to (1) nucleolar constrictions and heterochromatin, (2) competition for nucleic acid supply, (3) heterochromatin and speciation, and (4) the origin of heterochromatin. It is considered that nucleolar organizers and heterochromatin are not necessarily connected. The suggestion is made that in *S. sibirica* adaptation to growth at low temperatures inhibits cold starvation of the heterochromatin at metaphase. In discussing the possible role of heterochromatin in evolution, it is

pointed out that undercharged heterochromatin induced by environmental conditions, and variation produced by polygenes in the heterochromatin may play a part. Several investigators have suggested that heterochromatin has an important physicochemical function in the cell; on the basis of such a view the apparent absence of heterochromatin in some cases, e.g. certain species of *Fritillaria*, must be regarded as indicative of a finer degree of dispersion of genes showing heterochromatic behaviour. The author puts forward the view that polygenes, i.e. groups of replicated genes with a low order of specificity, may have the same functions in the cell as those attributed to recognizable heterochromatin, without showing the visible properties of heterochromatin.

2340. PIZA, S. DE TOLEDO.

The present status of the question of the kinetochore.

Genetica Iberica, Madrid 1950 : 2 : 193-99.

Literature on the type of kinetochore in Hemiptera, the scorpion *Tityus bahiensis* and *Luzula* is discussed. The author concludes that in both Hemiptera and *Tityus* the chromosomes possess one kinetochore localized at each end. It is thought that the chromosomes of *Luzula* probably resemble those of *Tityus* in being dicentric.

2341. SCHMIDT, W. J.

Der molekulare Bau der Zelle. (**The molecular structure of the cell**).

Nova Acta Leop. Carol. 1939 : 7 : No. 45 : Pp. 24.

The author reviews research on the molecular structure of the animal cell, including investigations on the nature of cytoplasm and its function in relation to chromosome movement. The connexion between chemical composition and the behaviour of chromosomes is discussed. Theories concerning the reproduction of gene material are also considered.

2342. DE CASTRO, D.

Notes on two cytological problems of the genus *Luzula* DC.

Genetica Iberica, Madrid 1950 : 2 : 201-09.

From his observations on *Luzula* and an examination of the relevant literature, the author suggests that a chromosome with a nonlocalized centromere is primitive, the properties ordinarily restricted to a localized centromere being possessed by the whole length of the chromosome. The term diffuse or any other term used to describe nonlocalized centromeres is therefore regarded as inappropriate. In the absence of a localized centromere the spindle fibrils will be attached to the entire length of the chromosome; spindle formation is therefore controlled by the genotype and subject to genic mutation. Localized centromeres, it is further suggested, are the result of one or more mutations in a primitive chromosome without a centromere; by mutation the function of the whole chromosome with respect to spindle formation would be transferred to an increasingly restricted segment. The evolutionary significance of the centromere is considered. Since chromosomes with localized centromeres occur most frequently, it is obvious that this type of centromere has been favoured in the course of evolution. The formation of persistent fragments and occurrence of chromosomal fusion, easily possible in the case of chromosomes without localized centromeres, could cause variation which might be of selective advantage; but it is not thought that fragmentation and fusion are special characteristics of primitive chromosomes. Finally, the author puts forward the view that probably the existence of chromosomes without localized centromeres is essential for the inverted sequence of the two divisions of meiosis observed by the author and his colleagues in studies of *Luzula* (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 756) and in investigations of *Carex* and various animals by other workers.

2343. WADA, B.

The mechanism of mitosis based on studies of the submicroscopic structure and of the living state of the *Tradescantia* cell.

Cytologia, Tokyo 1950 : 16 : 1-26.

In the living stamen hair cells of *Tradescantia* the nuclear membrane has been observed continuously from early prophase to the beginning of telophase; changes in its shape and structure are recorded. Disappearance of the nuclear membrane at metaphase, in fixed material, is therefore presumably an artifact. The intranuclear origin of the spindle fibres by conversion of protein molecular structure from corpuscles to unfolded polypeptide chains in parallel alignment with the polar axis is described. Forces generated during the arrangement of these fibrils, combined with the bipolarity of a mitotic cell, may push the chromosomes towards the equator. Chromosome movement during anaphase is thought to depend on the contraction of traction fibres running from the kinetochores of the chromosomes to the spindle poles; the shortening process may occur by conversion of fibrillar molecules to the more stable corpuscular state. The continuity between the spindle body and the phragmoplast, the processes of nuclear reconstruction, cell plate and nuclear membrane development and formation of the cell wall have been observed and interpreted submicroscopically.

2344. KOSTRUKOVA, K. JU.

(The cell theory in the light of Mičurinite biology).

Bot. Ž. (Bot. J.), Kiiv 1950 : 7 : No. 2 : 20-31. [Ukrainian].

The cell theory of Gorjaninov (1834) is regarded as a correct synthesis of facts governing the development of organic life. But subsequent development of the theory and accumulation of evidence which would not agree with the original simple formula led, during the critical period of natural science, to the metaphysical and idealist theories of Virchow, Weismann and Morgan. As a result cytology changed into the Morganist science, cytogenetics. Cytogeneticists regard the cell metaphysically as something constant and isolated from its environment and from other cells in the organism.

The cell theory has been thoroughly revised by the exponents of Soviet materialism, according to which every particle of living matter develops continuously. The basis of cellular life is found in the mutual relation between the cell and other cells and between the cell and its environment.

Critical evaluation of cytogenetical evidence by Soviet writers has proved the errors of the metaphysical law of the constancy of chromosome numbers and supports Lysenko's thesis on heterogeneity of tissues in organisms. The Morganist theories of the individuality and constancy of chromosomes have been disproved by Černojarov, Makarov and Volovik.

Mičurinite teaching rejects the concept of invariability during multiplication by division of cells. In the light of the theory of phasic development, the life of the cell is seen as a succession of slow, hardly noticeable quantitative changes during dormancy and as turbulent radical qualitative changes during division. Sometimes morphological changes in the cells can be observed during dormancy.

As a result of cell division two identical daughter cells can never be formed. One daughter cell may resemble the mother cell, but the other will differ from it qualitatively. These morphological differences between the daughter cells and the likeness of one daughter cell to the mother cell is sometimes clearly discernible, for instance in the vegetative and generative cells of the pollen grain.

2345. BATTAGLIA, E.

Sulla terminologia dei processi mitotici. (On the terminology of mitotic processes).

Nuovo G. Bot. Ital. 1947 : 54 : 596-632.

Mitosis is classified (1) according to the distribution of the chromosomes, whether regularly to the poles, irregularly to the poles, or by the formation of a restitution nucleus, and (2)

according to the structure of the chromosomes, which may appear as monochromosomes, diplochromosomes, polychromosomes, diplounivalents or diplobivalents.

2346. GARRIGUES, R.
 Sur les anomalies mitotiques du tapis des étamines. (**On the mitotic anomalies of the tapetum of the stamens**).
 Rev. Gén. Bot. 1951 : 58 : 305-18.

Quoting from other authors as well as his own observations, the author describes various types of mitotic aberrations observed in the tapetal cells of a number of plants belonging to different botanical families. These atypic mitotic figures occur during the process of meiosis in the pollen mother cells, and especially in its early stages. It is suggested that this intensified mitotic activity may be due to the effect of some substance, a mitotic-excitant, emitted by the microspore mother cells during their reduction division.

2347. CHÈVREMONT, M. and
 FIRKET, H.
 Action of beryllium on cells cultivated *in vitro*; effect on mitosis.
 Nature, Lond. 1951 : 167 : p. 772.

In experiments on chick embryos, inhibition of growth and mitotic abnormalities occurred as a result of treatment with beryllium sulphate. It is suggested that the chemical mechanism of these effects may involve specific inhibition of enzymes concerned in phosphorus metabolism and probably in nucleoprotein metabolism.

2348. ALMEIDA, J. L. F. DE, and
 SAMPAYO, T. M.
 Sobre a diferenciação nuclear nos micrósporos de *Luzula purpurea* Link.
 (**On nuclear differentiation in the microspores of *L. purpurea* Link.**)
 Bol. Soc. Broteriana 1950 : 24 : 2a Sér. : 323-32.

During mitosis I of the pollen grains of *L. purpurea*, the chromosomes passing to the poles nearest the centre of the tetrad remain deeply staining and short; the chromosomes passing to the peripheral poles lengthen and lose much of their staining capacity. At the same time, the concentration of proteins and lipids and the amount of water increase in the peripheral zone.

2349. HAGA, T.
 (**Mutual relationships in chiasma formation**).
 Jap. J. Genet. 1943 : 19 : 126-28. [Japanese].

Figures are given of the frequency of chiasmata in individual chromosomes of *Paris verticillata* and *Trillium kamtschaticum*. A discussion of the results in English, with a criticism of the chiasmotype theory, has already been summarized in *Plant Breeding Abstracts*, Vol. XIX, Abst. 1596.

2350. MATSUURA, H.
 (**Chromatid breakage and fusion at chiasmata**).
 Jap. J. Genet. 1944 : 20 : p. 80. [Japanese].

Observations in criticism of the chiasmotype theory are reported for *Trillium Hageae*, in which chromosome breakage at the chiasmata by refusion of the broken ends with one another is believed to occur.

2351. MATSUURA, H.

Chromosome studies on *Trillium kamtschaticum* Pall. and its allies. XIX. Chromatid breakage and reunion at chiasmata.
Cytologia, Tokyo 1950 : 16 : 48-57.

Based on cytological investigations of the triploid *T. Hageae*, in which a high frequency of chiasmata occurs, an alternative hypothesis to the inversion theory is introduced to explain the origin of chromatid bridges and fragments at meiotic anaphase. The reunion of chromatids at the chiasma region is thought to be the consequence of normal crossing over. The relationship between crossing over and chiasma breakage is discussed. Three types of breakage are distinguished; the X and Y types give rise to bridges and fragments at the first anaphase, while the O type results in dissolution of the chiasma.

2352. LANE, G. R.

X-ray fractionation and chromosome breakage.
Heredity 1951 : 5 : 1-35.

Experiments have been carried out on the effect of separating an X-ray dose of 360 r. into two equal fractions, using pollen of *Tradescantia bracteata*. Breakage frequency decreased as the period between the fractions was increased up to 4 hours. With more than 4 hours' separation the breakage frequency began to recover; with 8 hours' separation the frequency was little below that resulting from the continuous dose. With a separation period of 4 hours the frequency of breakage and reunion was reduced to considerably below twice the frequency induced by the single half-dose. These results indicate that the reduction in breakage frequency is not mainly due to an irreversible change, such as restitution, during the interval between the half-doses; thus reunion and restitution must take place usually more than 8 hours after breakage. The trend in breakage frequency accompanying increased duration of the period between the fractions can be explained by assuming that radiation has a depressing and temporary effect upon sensitivity to breakage. Possibly this effect is due to temporary accumulation of nucleic acid on the chromosomes during resting phase; within a certain range of intervals between the fractions, the accumulation resulting from the first half-dose would then reduce sensitivity to breakage caused by the second half-dose. The results point to the necessity of considering radiation-induced changes in sensitivity to breakage, in interpreting the results of quantitative experiments in which the doses have sufficient duration for the temporary effect to be expressed. Two further conclusions are reached as a consequence of the rejection of the theory of rapid reunion after induced breakage: (1) the competition between reunion and restitution need no longer be regarded as a process occurring rapidly after breakage, but may be envisaged as a much slower process, effective only in the elimination of reunion, as shown by Koller's experiments with very low dosage rates; and (2) the hypothesis of isochromatid breaks is invalidated, since the overlapping of apparent chromosome and chromatid breaks in time-scaled experiments of breakage, which is characteristic of the metaphase of X-rayed *Tradescantia* pollen grains, is the result of delayed reunion of broken ends. Finally, it is emphasized that radiation-induced breakage should be investigated not in isolation as a mechanical effect upon the chromosomes but in relation to the development and physiological processes of the cell and to radiation effects other than breakage.

2353. YOST, H. T. (JUN.).

The frequency of X-ray induced chromosome aberrations in *Tradescantia* as modified by near infrared radiation.
Genetics 1951 : 36 : 176-84.

A summary of an abstract describing the main results of this investigation has already appeared (cf. Abst. 1564). It has been found that (1) pretreatment and posttreatment with infrared radiation increase the frequency of chromosome aberrations induced by

X-rays, (2) posttreatment may be delayed 93–96 hours after the X-irradiation with no decrease in the effectiveness of the infrared radiation, and (3) the type of aberration induced depends upon the singleness or doubleness of the chromosomes at the time of the X-irradiation and is independent of the time of infrared irradiation and time of recombination. It is suggested that X-rays induce complete breaks and submicroscopic lesions of the chromosomes, that the effect of infrared radiation is a general weakening of the entire chromosome structure, so that in the case of pretreatment the breakage threshold for high energy radiation is effectively lowered, and in the case of posttreatment the number of X-ray induced breaks capable of recombination with other similarly broken ends is increased. In contrast to Swanson (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2355) the author is of the view that the production of potential breaks is confined to X-rays and that infrared irradiation does not produce a weakening of discrete loci.

2354. LORENZO-ANDREU, A.

Acción de varias sales alcalinas sobre la división celular en *Allium Cepa*.

(Action of some alkaline salts on cell division in *A. Cepa*).

An. Estac. Exp. Aula Dei 1951 : 2 : 174–86.

Various metallic salts have been shown to cause chromosome agglutination and contraction. Na⁺ and especially Li⁺ cations were more active than K⁺ or NH₄⁺. The anions Cl⁻, Br⁻, I⁻, NO₃⁻ and SO₄⁻² differed little in their effect.

2355. OEHLKERS, F. and

MARQUARDT, H.

Die Auslösung von Chromosomenveränderungen durch Injektion wirksamer Substanzen in die Knospen von *Paeonia tenuifolia*. (The induction of chromosome alterations by injection of active substances into the buds of *P. tenuifolia*).

Z. indukt. Abstamm.- u. VererbLehre 1950 : 83 : 299–317.

A solution of $\frac{m}{20}$ ethylurethane + $\frac{m}{200}$ KCl was injected into the flower buds in the early stages of meiosis. The first noticeable effect was a loosening of the chromosomes, leading to various types of fragmentation, translocations and other aberrations similar to those produced by irradiation. These included a clear case of half-chromatid translocation and various recombinations within a single chromosome. The aberrations are described and compared with those observed in buds of the same species treated with X-rays. It is pointed out that if half-chromatid chiasmata occur in other organisms after treatment they would account for certain mosaic and other delayed effects hitherto attributed to gene lability.

2356. TJIO, J. H.

Chromosome fragmentation by pyrogallol in *Vicia Faba*.

An. Estac. Exp. Aula Dei 1951 : 2 : 187–94.

Root tips were treated with pyrogallol solutions ranging from 0.1 mol./l. to 10 micro mol./l. Strong toxic effects were found in material treated with concentrations of 0.1–0.05 mol./l. for 2 hours and 0.02–0.005 mol./l. for 24 hours; various phenomena associated with agglutination were noted; the few mitoses which occurred were pycnotic. Slight c-mitotic effects were noted in 0.02 mol./l. and 0.002 mol./l. solution after 2 and 24 hours respectively. Radiomimetic effects were common in concentrations ranging from 0.005 mol./l. to 0.0005 mol./l. Chromosome breakage and erosion exhibited their highest frequencies during the first few hours of treatment; recovery tests revealed that radiomimetic disturbances rapidly disappeared.

2357. BATTAGLIA, E. and
DOLCHER, T.
"Eumeiosi" e "meiosi apomeiotica" seguita da "mitosi a diplounivalenti" nel tessuto somatico di *Sambucus*. (**Eumeiosis and apohomeotypic meiosis followed by mitosis with diplounivalents in the somatic tissue of *Sambucus***).
Nuovo G. Bot. Ital. 1947 : 54 : 633-41.

In the glandular tissue of the style of *S. nigra*, the cells may undergo a normal heterotypic meiotic division with no subsequent homeotypic division, the next division falling into the category of mitosis with diplounivalents. Occasionally, however, normal meiosis with the formation of four haploid cells also occurs.

2358. MATSUURA, H. and
HAGA, T.
Chromosome studies on *Trillium kamtschaticum* Pall. and its allies. IX. Chromosome aberrations induced by X-ray treatment.
Cytologia, Tokyo 1950 : 16 : 37-47.

After X-irradiation of *T. kamtschaticum* pollen mother cells at the resting stage, observations of the first subsequent meiotic and pollen grain divisions showed that breakage and reunion of chromosomes and chromatids had occurred. At the first metaphase of meiosis, evidence was obtained of union between two broken chromosomal ends or between a broken and an unbroken end. Some broken ends which remained free during meiosis were revealed at the first pollen mitosis as chromosome bridges. The frequency of bridges and loops, determined by the nature of kinetochore disjunction, was measured only from selected configurations favourable for observation; therefore, although these frequencies appear to support the two-plane theory (cf. Abst. 1550), they are inconclusive.

2359. TAKENAKA, Y.
(**On polyploidy and the size of organs, in particular the size of the stomata**).
Jap. J. Genet. 1943 : 19 : 21-45. [Japanese].

An extensive review is presented of the literature on gigas characteristics and increases in stomatal dimensions associated with chromosome reduplication. These increases in size are discussed with special reference to the ratio of the nuclear and plasmatic volumes.

2360. SCHWANITZ, F.
Untersuchungen an polyploiden Pflanzen. XII. Der Gigas-Charakter der Kulturpflanzen und seine Bedeutung für die Polyploidiezüchtung.
(**Investigations on polyploid plants. XII. The gigas character of cultivated plants and its significance in breeding by polyploidy**).
Züchter 1951 : 21 : 65-75.

The old cultivated polyploid crop plants unlike the newer experimentally obtained polyploids are far superior to their diploid parents in performance. The problem of this difference in the old and newer polyploids was investigated. A normal hexaploid strain of oats, a hybrid from two also normal hexaploid varieties of *Avena sativa*, showed the typical gigas character such as is usually found in artificially produced polyploids. It was thought that in this strain the gigas growth must be the result of a particular combination of genes and hence the author concludes that gigas growth may, in certain cases, have its origin in the genes alone, apart from doubling of the genome.

Comparative study of the size of the cell in many cultivated crop plants and that of the corresponding wild forms showed the diploid cultivated crop plants to be gigas forms with, in many cases, greatly enlarged cells. The gigas growth typical of cultivated plants may

be due to polyploidy, to mutation or combination of genes or possibly even to effects originating in the plasmon.

It is supposed that for each species there is an optimum cell size which will produce the performance expected in a cultivated plant; if this optimum be exceeded then vitality, assimilation and fertility decrease. The cultivated crop plants have in most cases attained, or nearly attained, their optimum values for cell size, so that on polyploidization the yield capacity and probably the quality must be lowered. The high yield and vitality found in the old polyploid cultivated crop plants as compared with the newer artificially produced polyploid forms are considered to be due to these old forms having been evolved from primitive cultivated forms or from wild species having small cells. The possibility should be noted that the optimum value for cell size in gigas plants which have been polyploidized may not coincide with the optimum cell size of the diploid gigas plant and in such polyploids the gigas character would be enhanced without the defects which appear when the original optimum for cell size in the normal diploid is exceeded.

It is suggested that polyploids derived from gigas forms may be "normalized" by a secondary regulatory process decreasing the cell size and then may show increased yield capacity. This hypothesis is also a possible explanation of the process by which, in some species, the high vitality of the old polyploids has originated.

The plants studied included many cereals, as well as lupin, radish, carrot, chicory and parsnip. Whether a plant form has or has not attained the optimum cell size for its performance as a cultivated plant is the decisive factor which will determine whether doubling of the genome will increase or decrease the yield; *Taraxacum Kok-saghyz* is discussed as an example of the validity of this dictum.

2361. HASKELL, G.

Plant chromosome-races and their ecology in Great Britain.

Nature, Lond. 1951 : 167 : 628-29.

Literature on chromosome races in *Nasturtium* and other genera is reviewed. In cases of ecological differences between chromosome races within a species, forms with lower chromosome numbers tend to prefer drier habitats; those with higher numbers prefer moist or wet habitats; in these ecological differences aneuploidy is less important than polyploidy. The physiological relationships involved in this phenomenon, and the problem of whether it is related to a change from sexual to apomictic or vegetative methods of reproduction, which often accompanies higher polyploidy, have not yet been determined.

2362. LEWIS, D.

Production of polyploids by colchicine and X-rays.

Nature, Lond. 1951 : 167 : 891-92.

Vegetative shoots of *Oenothera organensis* were treated with 0.2% colchicine solution for 48 hours. In the following year, 7 of the treated plants which appeared to be normal diploids were subjected to X-rays. The latter treatment increased the proportion of tetraploid tissue which originally must have been present, three of the plants producing tetraploid shoots. Plants treated with X-rays only have never given rise to tetraploid tissue. In addition, callus tissue of cut back tomato stems was treated with X-rays, but no marked increase in the proportion of tetraploid shoots was obtained. It is suggested that supplementary X-ray treatment may provide a means of overcoming difficulties of inducing polyploids in woody plants which give an unsatisfactory response to colchicine.

2363. STEBBINS, G. L. (JUN.).

Cataclysmic evolution.

Sci. Amer. 1951 : 184 : No. 4 : 54-59.

A popular account is given of the role of natural and colchicine-induced chromosome doubling in the development of new plant species.

2364. WITSCH, H. v. and
FLÜGEL, A.
Über photoperiodisch induzierte Endomitose bei *Kalanchoë Blossfeldiana*. (**Photoperiodically induced endomitosis in *K. Blossfeldiana***).
Naturwissenschaften 1951 : 38 : 138-39.

The leaves of *K. Blossfeldiana* become markedly succulent when treated with short days. Chromosome counts on these leaves showed them to contain a large proportion of cells with high degrees of polyploidy. Cells with up to $32n = 544$ were observed, the highest degree of polyploidy in long-day plants being octoploidy.

2365. BATTAGLIA, E.
Ricerche cariologiche e embriologiche sul genere *Rudbeckia* (Asteraceae). X: Le anomalie della meiosi durante la microsporogenesi di *Rudbeckia laciniata* L. con particolare riguardo alla formazione del nucleo di restituzione. [**Caryological and embryological researches on the genus *Rudbeckia* (Asteraceae). X. Meiotic anomalies during microsporogenesis in *R. laciniata* L. with special reference to the formation of a restitution nucleus**].
Nuovo G. Bot. Ital. 1947 : 54 : 405-31.

A restitution nucleus is regularly formed after meiosis I in the pollen mother cells of *R. laciniata*. Dyad or monad pollen grains, rarely triads, are produced, but subsequent degeneration results in almost complete pollen sterility.

2366. RUDORF, W. and
SCHWARZE, P.
Polyploidie-Effekte bei *Datura tatula*. (**Polyploidy effects in *D. tatula***).
Planta 1951 : 39 : 36-64.

Polyploid strains were compared with diploid controls with reference to morphological and anatomical features, total yield, fertility, assimilation, transpiration, arginine content, alkaloid content, the yield of alkaloid from various plant organs, and the carbohydrate, mineral and protein content. While rejecting the hypothesis of a direct relationship between increase in alkaloid content and genome reduplication, the writers offer explanations for the increased concentration of alkaloids, the lower plant production, reduced fertility and other characteristics of the polyploids.

The differences observed between the expression of the polyploid characteristics in the different strains confirm the dependence of polyploidization effects upon the genetic constitution of the original plant.

In spite of a lower leaf production, the tetraploids yielded 52-174% more alkaloid in field experiments, and with closer spacing still higher yields could, no doubt, be obtained.

2367. LÖWENSTEIN, J.
Die Aufgaben unseres cytologischen Laboratoriums. (**The tasks of our cytological laboratory**).
Unsere Saatzucht Hasselhorst : 27-29.

A short description is given of the problems relating to the increasing of yields and to breeding by polyploidization, which have been dealt with in the Hasselhorst laboratory of the firm F. von Lochow-Petkus.

The application of cytological study in the timely elimination from tetraploid rye stands of any plants which might later exhibit gapping is described; considerable success is claimed in decreasing heritable gapping. Preparations are being made for breeding a tetraploid spring rye. The production of polyploid varieties of barley, late turnip and birdsfoot trefoil by artificial methods, e.g. the use of colchicine, is being investigated.

2368. SVETOZAROVA, V. V. and
ELLENGORN, J. A. E.

(The processes of fertilization in plants).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :
24-26. [Russian].

Cytological analyses of *Tulipa* species confirm the evidence of previous experiments with *Amaryllis* (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1421) on somatic fertilization of the female tissues by the male gametes. The effect of such tissues upon the development of the embryos is discussed in connexion with some theoretical and practical observations made by Mičurin.

2369. DERMEN, H. and
SCOTT, D. H.

Chromosome counts in apple and strawberry aided by paradichlorobenzene.

Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 145-48.

A technique is described for making chromosome counts in which use is made of a saturated solution of paradichlorobenzene prior to the sectioning of root tips. This pretreatment appears to cause a slight disturbance in the plate formation so that not all the chromosomes are orientated in the same flat plane; it also results in shortening of the chromosomes and thus their separation from one another.

2370. LESSLER, M. A.

The nature and specificity of the Feulgen reaction.

Arch. Biochem. Biophys. 1951 : 32 : 42-54.

On the basis of the experimental data obtained, the following aspects are discussed: specificity of the Feulgen reaction for desoxypentose nucleic acid (DNA); localization of the colour at the site of DNA concentrations; nature of the reacting components; and the value of the reaction as the basis of a cytological technique for determining DNA content.

***BOTANY**

2371. BATTAGLIA, E.

Ricerche cariologiche e embriologiche sul genere *Rudbeckia* (Asteraceae). XI. Semigamia in *Rudbeckia speciosa* Wender. [**Caryological and embryological researches on the genus *Rudbeckia* (Asteraceae). XI. Semigamy in *R. speciosa* Wender**].

Nuovo G. Bot. Ital. 1947 : 54 : 511-59.

In *R. speciosa*, the egg, though not the endosperm, develops without fertilization. The microgamete that does not fuse with the polar nucleus undergoes division in the cytoplasm of the embryo sac, a phenomenon termed by the author semigamy.

2372. BATTAGLIA, E.

Sulla terminologia dei processi apomittici. (**On the terminology of apomictic processes**).

Nuovo G. Bot. Ital. 1947 : 54 : 674-96.

The following definitions of apomictic phenomena are proposed:—

The formation of the female gametophyte is termed *haplospory* if development from the mother cell follows normal meiosis. If meiosis is irregular and restitution gives rise to a diploid initial cell, the process is termed *diplospory*. Should the mother cell give rise to a

* General studies, see also individual crops.

gametophyte by mitotic division, the phenomenon is termed *gonial apospory*. Should a somatic cell produce the gametophyte, the process is termed *somatic apospory*. As regards fertilization, the normal process is termed *gamy* or *amphigamy*. Division of the male gamete within the embryo sac but without fusion is termed *semigamy*. Penetration of the embryo sac by the male gamete and stimulation by it of division of the egg though without fusion, is termed *pseudogamy*. A more remote stimulation to division of the egg by the pollen tube, in which the male gamete does not enter the embryo sac, is termed *apogamy*. The term *parthenogenesis* is reserved for cases in which the pollen is in no way necessary for the further development of the egg.

2373. CAMP, W. H.

Biosystematy.

Brittonia, New York 1951 : 7 : 113-27.

The status of classical taxonomy is discussed with respect to the aims of biosystematy. In place of the species the term binom is introduced for a taxonomic group, "consisting of one or more specimens in a museum collection to which a binominal has been attached," until experimental information regarding the genotype has been obtained.

2374. SINSKAJA, E. N.

(The concept "variety").

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 : 30-32. [Russian].

DVORJANKIN, F. A.

(A variety of an agricultural plant).

Ibid. 1950 : No. 9 : 32-38. [Russian].

In the first paper, the Mičurinite discussion of the concept variety which has been reported in *Selekcija i Semenovodstvo* since 1948, is continued, and in the second the dispute is dismissed as futile and scholastic. Practical importance is attached by Dvorjankin to the materialist Mičurinite theory on the constancy of varieties.

2375. RUGGLES GATES, R.

The taxonomic units in relation to cytogenetics and gene ecology.

Amer. Nat. 1951 : 85 : 31-50.

The genetical and taxonomical approaches to the classification of plant species are discussed with reference to genic and chromosomal changes underlying speciation, subspecific categories, criteria of species, isolating mechanisms and interspecific hybridization. The general conclusion is reached that the taxonomist should be the final arbiter in classification and that reproductive isolation is inadequate as the main criterion of species.

2376. BRUEHL, G. W.

***Rhizoctonia solani* in relation to cereal crown and root rots.**

Phytopathology 1951 : 41 : 375-77.

Observations made at South Dakota on the relationships between *R. Solani* and numerous host plants in the Gramineae and other families have resulted in the distinction of aerial forms of the pathogen, entering the host by the stomata, and subterranean varieties, which parasitize root tissues only.

AGRICULTURE

2377. HÄNNINEN, P.

Koeympyröiden käytöstä kenttäkokeissa. (Using round plots for field experiments).

Valt. Maatalousk. Tiedon. 1951 : No. 223 : Pp. 6.

The use of round plots, already employed for certain field experiments in Sweden, has been

studied in Finland. By an improved plot boundary marker, the possibility of errors in plot size has been practically eliminated.

2378. ZELLER, A.
Die neuen Verfahren zur Berechnung und Anlage landwirtschaftlicher Versuche. (**The new methods for the calculation and laying out of agricultural trials**).

Veröff. Bundesanst. alp. Landw. Admont 1951 : No. 4 : 43-68.

The author explains fully the statistical, newer method of laying out and evaluating agricultural trials and emphasizes that its more general application is essential for Austrian agriculture.

2379. GYSEL, A.
Beiträge zur Technik des landwirtschaftlichen Versuchswesens. I. Geschichtliche Entwicklung, Wesen und Ziele der Versuchstechnik dargestellt am Feldversuch. (**Contributions to the technique of agricultural experimentation. Part I. Historical development, nature and aims of experimental technique, as exemplified in the field trial**).

Schweiz. landw. Mh. 1951 : 29 : 98-102.

KELLER, E. R.
Beiträge zur Technik des landwirtschaftlichen Versuchswesens. II. Über die Anlage von Feldversuchen. (**Contributions to the technique of agricultural experimentation. Part II. On the layout of field trials**).

Ibid. 1951 : 29 : 209-20.

In part I the author reviews the development of the application of statistical methods in agricultural research. It is pointed out that reliability and accuracy in carrying out the actual experimental work are quite as important as the basic principles and the evaluation of the results. In part II the methods of laying out field trials are described and discussed in detail.

2380. SAUGER, L. and
TOURTE, R.
Contribution à la technique des essais culturaux au Sénégal. Forme et dimensions des parcelles. Nombre de répétitions. (**A contribution to the technique of cultivation experiments in Senegal. Shape and size of the plots. Number of repetitions**).

Agron. Trop. 1951 : 6 : 29-37.

In Senegal two-year blank experiments with groundnut and millet have shown that the unit plots each year should have an area of 75 m² and 8-10 or 5-6 repetitions should be used according to the degree of accuracy required.

2381. JOLEY, L. E. and
HESSE, C. O.
Effect of methyl bromide fumigation on flower opening and pollen viability of nectarine.

Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 231-33.

Fumigation of plant materials, introduced into or distributed from the gardens of the Division of Plant Exploration and Introduction of the US Department of Agriculture, is regularly undertaken as a precaution against the distribution of insect pests. The possible effects of this practice on pollen viability has been studied, since supplies of pollen

from these gardens are used in breeding. It was found that nectarine and peach pollen, extracted and dried for a period, is in a better condition to withstand any harmful effects of methyl bromide fumigation than the fresher pollen present in practically open blossoms.

***DISEASES AND INJURIES, BACTERIA, FUNGI, VIRUSES**

2382. KELNER, A.

Revival by light.

Sci. Amer. 1951 : 184 : No. 5 : 22-25.

It has been found that visible light has the power to resuscitate microorganisms apparently killed by exposure to ultraviolet rays and to decrease the frequency of mutations induced by ultraviolet light.

2383.

Toevoeging van een afdeling resistentieonderzoek aan het I.P.O.
(**Addition of a section for research on resistance to the IPO**).

Meded. Direct. Tuinbouw 1951 : 14 : p. 314.

Afdeling Resistentie-onderzoek van het I.P.O. (**The Section for Research on Resistance of the IPO**).

Vakbl. Biol. 1951 : 31 : 115-16.

On the advice of the Committee for the Study of Research on Resistance of newly bred Varieties to Plant Diseases, a section for research on resistance has been attached to the Instituut voor Plantenziektenkundig Onderzoek [Institute for Research on Diseases of Plants] in Holland. The functions of the new section as a centre of information and an advisory body which other institutes and laboratories engaged in breeding for resistance can consult are explained.

2384. BAILEY, N. T. J.

The estimation of linkage in bacteria.

Heredity 1951 : 5 : 111-24.

"With bacteria linkage data is obtained from the crossing of complementary types by classifying organisms, for which recombination over an odd number of segments has been obligatory. If the loci, for which both members of a contrasting pair of characters are scorable, are distal to the segment over which recombination is compulsory, then, on the assumption of no interference, the data may be analysed by the methods already used in experimental linkage work.

"If, on the other hand, these loci lie within the segment, then special methods of analysis are required. The present paper develops the appropriate maximum likelihood treatment of a selection of such problems arising in three, four and five-point crosses, and gives some worked examples." [Author's Summary].

2385. LURIA, S. E.

Recent advances in bacterial genetics.

Bact. Rev. 1947 : 11 : 1-40.

Various aspects of bacterial mutability are discussed, with particular reference to the detection and frequency of mutants, analysis and interrelationship of different kinds of mutation, factors inducing mutation and the correlation of mutability with sexual mechanisms, selection and evolutionary considerations.

* General studies, see also individual crops.

2386. ATWOOD, K. C.,
SCHNEIDER, L. K. and
RYAN, F. J.

Periodic selection in *Escherichia coli*.

Proc. Nat. Acad. Sci., Wash. 1951 : 37 : 146-55.

The results of experiments on the serial transfer of *E. coli* cultures for long periods reveal that, for reasons not yet fully understood, the population is periodically replaced by a new biochemical type arising in the predominant component and characterized by a selective advantage over the previous type. In periodic replacement selective action is exerted against all mutants except the one taking the place of the former predominant type, whether or not these mutants are selected against in any other way. The phenomenon may be regarded as a mechanism that postpones the establishment of mutational equilibria and thus stabilizes the major component of the population. The adaptive value of periodic selection is illustrated by considering the stability of a prototrophic population on a complex medium. It is also pointed out that periodic replacement does not affect the possibilities of adaptation to new environments: if the environment selects against the predominant type, periodic replacement will be arrested until the population is transformed by the adaptive growth of the appropriate mutant.

2387. BRAUN, W.

Bacterial dissociation. A critical review of a phenomenon of bacterial variation.

Bact. Rev. 1947 : 11 : 75-114.

On the basis of recent research the older concepts of bacterial dissociation, particularly those of cyclogeny and lasting modifications, have been eliminated. It has been shown that changes formerly regarded as characteristic of dissociation, such as linked variations and the occurrence of numerous mutants classified into smooth (S), rough (R), mucoid (M) or intermediate (I) groups, can be explained satisfactorily on the basis of mutation and selection and can be regarded as part of general bacterial variation. Dissociation is, therefore, no longer considered to constitute a particular form of bacterial variation, and the term should be applied solely to a spontaneous change of one or more members of a bacterial population and subsequent establishment. Some of the implications of recent results upon the basic problems of taxonomy, epidemic waves and immunology are discussed.

2388. VERVELDE, G. J. and
WIERSMA, J. H.

Enting met reine *Rhizobium*-cultures. (Inoculation with pure *Rhizobium* strains).

Landbouwk. Tijdschr., Wageningen 1951 : 63 : p. 186.

Experiments in Holland with seed of peas and lupins inoculated with *Rhizobium* strains suggest that it should be possible to isolate better strains from the wild population of bacteria.

2389. RUBIN, B. A.,
PERRY, M. F. C. and
THANASSI, F. Z.

The relation of the mechanism of antibiotic action to studies of the genetics of streptomycin resistance.

Rep. US Atom. Energy Comm. AECU-1144: p. 1 and Nuclear Sci.
Abstr. 1951 : Abst. 2642.

A method for the quantitative and qualitative determination of streptomycin resistant mutants of *Escherichia coli*, based upon the rapid and complete killing of large numbers of nonmutants, is described. Cytological examination has revealed abnormal nuclear

structure in nonmutants grown in streptomycin, possibly indicating interference in nucleic acid metabolism. The increased mutation rates obtained at lower concentrations of streptomycin are attributed to growth differences and to streptomycin sensitivity of some "resistant" mutants. Contrary to expectations, a larger proportion of streptomycin requiring mutants has been detected at lower concentrations.

2390. JAMES, A. P.
Development of tyrosine-independent strains of *Lactobacillus arabinosus*, and some physiological properties of nutritional variants.

Iowa St. Coll. J. Sci. 1951 : 25 : 265-67.

L. arabinosus normally requires tyrosine for growth; a culture can however become adapted to a medium containing no tyrosine. It was found that the process of adaptation to absence of tyrosine was associated with the early advent and subsequent relaxation of an inhibition of adapted cells in the cultures in which they arose. It is suggested that the renewed growth of the inhibited cells involved a mutation of already adapted cells to resistance to inhibition. Tyrosine independent strains isolated from different cultures varied in growth rate. Adaptation of tyrosine independent cells to media deficient in tyrosine and phenylalanine occurred with high frequency.

2391. NELSON, T. C.
Kinetics of genetic recombination in *Escherichia coli*.
Genetics 1951 : 36 : 162-75.

Experimental data on the recovery of genetic recombinants in *E. coli*, which were obtained by selective screening for prototrophs, correspond with those expected on the theoretical basis of a biparticulate frequency distribution. Support is therefore given to the view that syngamy occurs.

2392. YAW, K. E. and
CUTTER, V. M. (JUN.).
Crosses involving biochemically deficient mutants of *Allomyces arbuscula*.
Mycologia 1951 : 43 : 156-60.

Biochemical mutants were induced by irradiating zoosporangia with ultraviolet rays; mutants 7 and 23 were chosen for further study. Data from the cross wild type x mutant 23 indicated that the character of lysine requirement was due to the mutation of a simple gene. The segregation ratio from the cross wild type x mutant 7 only approximated 1 : 1 for this character; the ratio may have been affected by a semi lethal factor. The cross between the mutants 7 and 23 also failed to give a 1 : 1 segregation; possible explanations of this behaviour comprise decreased viability of the mutant strains, reverse mutation in the progeny and clumping of the zoospores used in securing the progeny for the tests of growth requirements. The life cycle of *A. arbuscula* is discussed.

2393. SHENG, T. C.
A gene that causes natural death in *Neurospora crassa*.
Genetics 1951 : 36 : 199-212.

Ultraviolet irradiation of *N. crassa* induced a mutant strain characterized by an ever decreasing growth potential under all nutritional conditions and an irreversible cessation of growth either on an agar surface or in liquid culture. The mutant was found to depend upon a single gene recessive to the allele of the wild type designated *nd* (natural death). The gene has been located on the right arm of the chromosome associated with mating

type, about 15 map units from the centromere. The mutant strain could be rejuvenated through heterocaryosis with non-*nd* strains, crossing with non-*nd* strains, and through crossing with another *nd* strain which was in a heterocaryotic condition. It is suggested that the nature of the mutant depends upon cytoplasmic aging, due to the accumulation of a self-intoxicating substance during growth.

2394. ADELBERG, E. A.,
BONNER, D. M. and
TATUM, E. L.
A precursor of isoleucine obtained from a mutant strain of *Neurospora crassa*.
J. Biol. Chem. 1951 : 190 : 837-41.

Mutant 16117 accumulates in its filtrate a precursor of isoleucine which has been isolated and characterized as α - β -dihydroxy- β -ethylbutyric acid.

2395. TEAS, H. J.
Effect of canavanine on mutants of *Neurospora* and *Bacillus subtilis*.
J. Biol. Chem. 1951 : 190 : 369-75.

Mutants of *Neurospora*, each with an aminoacid requirement which appeared to be dependent upon a single gene, were tested for their growth response to canavanine, an aminoacid found to have an inhibitory effect upon microorganisms. One of the mutants was able to grow if supplied with threonine, isoleucine, α -aminobutyric acid, homoserine or canavanine; this resistance to canavanine, due to the conversion of the aminoacid into a noninhibitory product with a growth promoting activity similar to that of homoserine, was inherited independently of the other biochemical features of the strain. A mutant of *B. subtilis* requiring homoserine or threonine plus methionine was also able to grow if supplied with canavanine.

2396. FLING, M. and
HOROWITZ, N. H.
Threonine and homoserine in extracts of a methionineless mutant of *Neurospora*.
J. Biol. Chem. 1951 : 190 : 277-85.

The biochemical mutants studied originated as ascospores from crosses of ultraviolet-irradiated conidiospores with an untreated wild type. Extracts of a methionineless mutant contained two substances, one active for a threonineless mutant and the other for a homoserineless mutant; the substances have been identified as l-threonine and l-homoserine respectively.

2397. CASTELLI, T.
I lieviti della fermentazione vinaria del Piceno. (The yeasts responsible for fermenting wine in the Piceno province).
Ann. Fac. Agr., Perugia 1947 : 4 : 45-71.

Samples of must were taken in four different places in the province and the yeasts in them identified. Full descriptions are given of species encountered which were not described in previous studies. The predominant species are *Saccharomyces ellipsoideus* and *Pseudosaccharomyces apiculatus*, the former being more frequent on the higher ground and the latter in the plains. The fermenting capacity of the strains of *S. ellipsoideus* found in the hills was greater than that of the strains from the plains, where a larger number of other species of lower fermentative ability were also encountered.

2398. RJABČENKO, I. M.
(The study of yeasts in the vineyards of "Abrau Djurso").
 Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 :
 No. 1 : 16-18. [Russian].

Notes on selection of yeasts, mostly found on the grapes and tendrils of vines, at a state farm near Novorossiisk, are included. Altogether 498 pure cultures were obtained from which 46 were selected for a detailed study. Some of the yeasts, notably races 17 and 31, have been tested under laboratory and industrial conditions and show promise. Race 17 is suitable for common wine making and race 31 for champagne.

2399. KOSIKOV, K. V.
(The inheritance of enzymic properties in yeasts).
 Trudy Inst. Genetiki (Proc. Inst. Genetics) 1950 : No. 17 : 157-68.
 [Russian].

Evidence obtained in hybridization experiments with yeasts disagrees with the chromosomal theory of inheritance and supports Lysenko's thesis that inheritance is determined by external conditions and mutual interaction between the components in the cross.

The F_1 of *Saccharomyces ellipsoideus* x *S. globosus*, *S. carlsbergensis* x *S. globosus* and *S. carlsbergensis* x *S. Chodati* was capable of fermenting sugar although *S. globosus* and *S. Chodati* are incapable of fermenting sucrose and raffinose and *S. globosus* is incapable of fermenting maltose.

The F_2 of *S. ellipsoideus* x *S. globosus* segregated in respect of its capacity for fermenting sucrose in the ratios 2 : 2, 3 : 1 and 4 : 0 according to varied external conditions and to time of observation.

Similar variation in the segregation ratios occurred in the F_2 of *S. carlsbergensis* x *S. globosus*, some cultures of which became capable of sucrose fermentation only on the fifth, ninth, fifteenth and twenty-seventh day after inoculation.

Of the 24 cultures of *S. carlsbergensis* x *S. Chodati*, seven were capable of fermenting sucrose and maltose and four of fermenting maltose, while three cultures were incapable of either sucrose or maltose fermentation. The last named cultures were remarkable because they were obtained by hybridizing species which were capable of maltose fermentation. The enzymic activity in some cultures became apparent earlier than in others.

2400. POMPER, S.
Recent developments in yeast genetics.
 Wallerstein Laboratories Communications 1951: 14 : No. 44 : 31-42.

The text of this review has already been published (cf. Abst. 123), except for an addendum now included, briefly referring to some more recent papers.

2401. WINGE, Ö.
The relation between yeast cytology and genetics. A critique.
 C.R. Lab. Carlsberg 1951 : 25 : Sér. Physiol. 85-99.

The absence of adequate cytological and genetical evidence for claims concerning the interconversion, by mutation, of haploid, diploid and tetraploid phases, made by such workers as Subramaniam, Ranganathan, Duraiswami, Krishna Murthy and Šatava, forms the basis of a critical survey of their work. Knowledge of yeast chromosomes, gained during this century, is briefly summarized. It is suggested that Mendelian segregation in yeast strains, which would be expected to produce heterogeneous progeny, should not be dismissed as a possible explanation of many macroscopic observations.

2402. ROMAN, H.,
HAWTHORNE, D. C. and
DOUGLAS, H. C.

Polyploidy in yeast and its bearing on the occurrence of irregular genetic ratios.

Proc. Nat. Acad. Sci., Wash. 1951 : 37 : 79-84.

Irregular segregation ratios for the genes conditioning mating type (a and α), galactose fermentation and non-fermentation (G and g respectively) and flaky and free dispersion in liquid medium (F and f respectively) were obtained from an ascus originating from a cross between two clones of *Saccharomyces* that were presumably haploid and of the composition agf and αGF respectively. No evidence of linkage between the three loci concerned was detected. Probably each of the spores was actually diploid and a disomic condition existed for at least three chromosomes of the complement; two possible alternative modes of origin of this ascus are discussed. Further evidence from previously published data, supporting the view that polyploidy may account for irregular ratios, is presented, attention being drawn to (1) the simultaneous occurrence of irregular ratios for two or more characters in spores from a single ascus, and (2) the fact that disturbances in segregation for mating type accompany irregular ratios for other characters.

2403. FOWELL, R. R.

Hybridization of yeasts by Lindegren's technique.

J. Inst. Brew. 1951 : 57 : 180-95.

An improved form of Lindegren's technique of single cell isolation followed by mass mating is described, which proved valuable in breeding new yeast strains for industrial use and in hybridizing yeasts with poor powers of sporulation and low spore viability. By using this version of Lindegren's method pure diploid strains can be secured; their hybridity can be established with the aid of a sufficient number of genetical markers. For genetical studies hybridization by Ephrussi's method of pairing haploid cells is recommended as reliable and straightforward. Various explanations of the many cases of irregular segregation are examined. Adaptation, supernumerary divisions in the ascus, plasma-genes and multiple factors are regarded as possible explanations of many irregular ratios. In view of the information at present available, Lindegren's hypothesis of gene conversion (cf. *Plant Breeding Abstracts*, Vol. XXI, p. 227) is considered to be premature.

2404. KOSIKOV, K. V.

(Hybridization as a factor causing variability in microorganisms. The nature of adaptability in yeasts to sucrose fermentation).

Dokl. Akad. Nauk. SSSR (Rep. USSR Acad. Sci.) 1948 : 63 : 573-76.
[Russian].

The F_1 from *Saccharomyces ellipsoideus* x *S. globosus* was capable of fermenting sucrose and maltose, while some F_2 hybrids were capable of maltose but not of sucrose fermentation, and other F_2 hybrids were incapable of fermenting either sucrose or maltose. Cultures capable of maltose fermentation were more readily adapted to growth upon sucrose substrates than cultures originally incapable of fermenting either sucrose or maltose.

2405. CASTELLI, T.

Indagini sulla vinificazione con fermenti selezionati in ambiente solforoso. (Studies on wine fermentation with selected yeasts in a medium containing SO_2).

Ann. Fac. Agra., Perugia 1948 : 5 : 27-40.

Experiments with four selected strains of *Saccharomyces ellipsoideus* showed that they differed in the amount of alcohol they produced from different types of must. Strain 20,

a selection made at Perugia, gave the best results under all conditions and particularly with musts obtained from damaged grapes to which fairly high doses of SO₂ had been added.

2406. SZEMBER, A.
Mikroflora drożdżowa owoców krajowych. (**The yeasts from fruits in Poland**).
Ann. Univ. Mariae Curie-Skłodowska Lublin 1950 : 5 : 221-38.

Fifty-four strains of yeasts, isolated from various kinds of small fruits grown in Poland and also from imported raisins, figs and grapes, were studied as regards their capacity for fermenting sucrose, glucose, levulose, galactose, mannose, maltose and lactose. Results showed that the great majority of the strains would be of no use in wine production; three, however, fermented over 90% of sucrose.

2407. GATTANI, M. L.
Induced variation in the germination of chlamydospores of *Ustilago scitaminea*.
Curr. Sci. 1951 : 20 : p. 134.

Deviations from the normal type of germination were observed among spores germinated upon water agar containing the fungicide hydrophobic colloidal sulphur. In the control plates all spores germinated normally.

2408. HOLTON, C. S.
Methods and results of studies of heterothallism and hybridization in *Tilletia caries* and *T. foetida*.
Phytopathology 1951 : 41 : 511-21.

An improved method for inoculating with paired monosporidial lines is described. The heterothallic nature of *T. caries* and *T. foetida* was demonstrated at Washington by inoculating Hindi wheat with all possible paired combinations of different races; lines were regarded as compatible if infection occurred. Two sex compatibility factors were found in matings between monosporidial lines from individual chlamydospores; from material originating from different chlamydospores there was no evidence of multiple factors for sex determination. A sex-linked lethal deficiency was observed in race L-8 of *T. foetida*.

Investigations concerning interspecific hybridization between *T. caries* and *T. foetida* have revealed segregation and recombination of factors determining the nature of reticulate markings on the chlamydospores.

2409. GOPALKRISHNAN, K. S.
Notes on the morphology of the genus *Hemileia*.
Mycologia 1951 : 43 : 271-83.

From a comparative study of soral characteristics in 32 species of *Hemileia* it is suggested that the genus may be subdivided with respect to the occurrence of subepidermal and two distinct forms of superstomal sori. Considerable variability in the degree of specialization of sporogenous basal cells and the extent of disruption of the guard cells and adjacent epidermal cells by the sori is thought to indicate that some named species may only be races of the same species.

2410. GEORG, L. K.
The relation of nutrition to the growth and morphology of *Trichophyton violaceum*. I. The vitamin and amino acid requirements of *T. violaceum*.
Mycologia 1951 : 43 : 297-309.

The results of nutritional experiments show that 10 of the 11 strains of *T. violaceum* studied are deficient in thiamin and require the pyrimidine portion of the thiamin

molecule for normal growth. Strain 365 was not thiamin deficient but required l-histidine; it was also morphologically distinct. However, a single spore culture from 365 developed sectors morphologically and physiologically identical with the 10 other strains and was designated 365a. The original 365 is considered to be an unstable mutant form of *T. violaceum*.

2411. HAZEN, E. L.
Effect of nutrition on the colony characteristics and macroconidial formation on *Microsporium audouini*.
 Mycologia 1951 : 43 : 284-96.

The results of observing 13 strains of *M. Audouini* grown on different media indicate that macrospore formation is dependent on the nature of the strain rather than on the nutritional effects of the cultural medium.

2412. MCKEE, R. K.
Mutations appearing in *Fusarium caeruleum* cultures treated with tetrachlornitrobenzene.
 Nature, Lond. 1951 : 167 : p. 611.

Mutants of *F. caeruleum* were obtained which showed resistance to the fungistatic action of tetrachlornitrobenzene. It cannot be assumed that mutants able to grow faster in the presence of tetrachlornitrobenzene would necessarily cause more dry rot than the normal strains attacking potatoes treated with this substance as a control measure.

2413. KULIK, S. A.
(Artificially induced speciation in *Fusarium*).
 Agrobiologija (Agrobiology) 1950 : No. 6 : 28-36. [Russian].

In laboratory trials at Omsk, the parasitic fungus *F. avenaceum*, was induced to change into a saprophytic species, *F. herbarum* and from *F. herbarum* again into *F. avenaceum*. Speciation is ascribed to shattered inheritance of its spore cells when cultured in different nutrient media and under different temperature conditions.

The two fungi showed great differences in their morphological and physiological properties. During the process of speciation one species changed into the other without any intermediate stages. The two species, which were antagonistic, remained constant for several generations when cultured upon the same medium.

The study of external conditions which lead to speciation in *Fusarium* is suggested as a possible method of controlling brown foot rot and ear blight in wheat.

2414. BAKKER, M.
 De verandering van de virulentie van *Cladosporium fulvum* Cooke tengevolge van het invoeren van nieuwe tomatenrassen. (**Alteration of the virulence of *C. fulvum* Cooke as a result of the introduction of new varieties of tomatoes**).
 Meded. Direct. Tuinbouw 1951 : 14 : 309-13.

The work of Bailey, Langford, De Bruyn and other investigators on physiological races of *C. fulvum* is reviewed with reference to a research programme for similar studies in Holland, as physiological races of the fungus may also have arisen there. With the same test collection and the same conditions as in Canada, Dutch investigations will be carried out on what strains exist in Holland and how they may have arisen, e.g. by mutation or adaptation.

2415. ODRIÓZOLA, M.
Virus resistance as a genetical problem.
 Genetica Iberica, Madrid 1950 : 2 : 211-15.

Arguments are put forward in favour of the hypothesis of the plasmagene and some

consideration is given to Darlington's concept of the provirus (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2293).

It is suggested that the functional disturbance produced by a virus in its host may be caused by the loss of their particular enzyme or substrate by the plasmagenes in competition with the virus particles. A low degree of infection or virtual immunity would result from the lack of a proper receptor in the host cells. In the case of a high degree of tolerance, either the appropriate receptor may be present in such abundance that no serious competition arises between the plasmagenes and virus entities, or competition may occur and the cell is maintained by a less active process or through some alternative path. This hypothesis on the nature of virus infection is briefly discussed in relation to the problems of breeding for virus resistance in crops.

CROP PLANTS

2416.

Report on the work of the College for the year ending 30th September, 1950.

W. Scot. Agric. Coll. 1951 : Pp. 61.

In addition to the work referred to below varietal trials of oats, fodder beet and potato were carried out (cf. Abst. 1799).

Raspberry

Selection is in progress.

Strawberry

Auchincruive Climax is now well established commercially (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1855); new strains of the red core fungus have, however, appeared which can attack this hitherto immune variety. Seedlings were selected for red core resistance; a number of them were chosen for more intensive trial and for rapid propagation on account of their promising fruiting qualities. The aim of this work is the production of a variety possessing good all round qualities which ripens earlier than Climax. An extended programme of breeding was carried out in 1950; a large number of seedlings are available for further study.

Tomato

The Auchincruive varieties 1, 4 and 5 have not maintained their resistance to *Cladosporium* leaf mould. Seed of wild species other than *Lycopersicon pimpinellifolium* and seed of selections from crosses between wild species and standard varieties has been obtained from the USA and Canada. The characteristics of some of this material have been recorded; crosses with British varieties will be made in the coming season.

2417. BELL, G. D. H.

The contribution of plant breeding to crop improvement.

J. Minist. Agric. 1951 : 58 : 91-95.

Breeding work on cereals, herbage plants and potatoes in Britain is historically surveyed.

2418.

Forty-first Annual Report of the John Innes Horticultural Institution, Bayfordbury, Hertford 1950 (1951) : Pp. 41.

Crane, M. B.

Pomology Department (pp. 10-13).

Cytoecology

The relationship between chromosome number and plant environment in Britain is under investigation. In some instances, e.g. *Acer*, different distributions of diploids and polyploids of the same or closely related species have been noted with regard to habitat, soil type, latitude and maximum midsummer temperatures.

Lathyrus

A study of 25 species of *Lathyrus* has revealed differences in nucleolus formation. British forms of *L. pratensis* have been found to be autotetraploid; their seed production is, however, good. Colchicine-induced tetraploids of the diploid species *L. hirsutus* are highly fertile.

Capsicum

Interspecific hybrids are being studied.

Apple

As a result of their performance in the National Fruit Trials, Merton Prolific and Merton Worcester (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 7) have received the Award of Merit. The seedlings 1764 (Cox's Orange x Golden Russet) and 2326 (McIntosh Red x Cox's Orange) have been recommended for inclusion in the National Trials.

Cherry

The following varieties have been assigned to their incompatible groups: II, Merton Favourite and Caroon B; IV, Kassin's Frühe Hertz; X, Rodmersham Seedling; XII, Caroon A.

Seedling 1278 (Ursula Rivers x Noble), distinguished by exceptionally large fruits, has been recommended for inclusion in the National Trials.

Tomato

Breeding for resistance to *Cladosporium* leaf mould is in progress; study of the physiological races of the fungus has been initiated. The superiority in yield of some F_1 lines in comparison with their parents and the best commercial varieties has been maintained. An even more compact and earlier form than the bush variety Puck has been produced (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2215).

Sweet corn

Inbreeding of selected lines continued. The spread of pollen from a central source to detasselled plants sown in radiating stringers was analysed (cf. Abst. 2283). All varieties so far grown are more or less susceptible to attack by frit fly. Susceptibility is not associated with fitness for the climate of England nor with date of maturity, but the least susceptible varieties originated from the eastern United States. Breeding for increased resistance is to continue.

Heredity of double flowers

A survey of the records of flower breeders has revealed that in most species the single flower is dominant to the double; in others it is incompletely dominant and in a few completely recessive. Cases are known in which the character of single or double flowers depends upon two or more genes.

Lewis, D.

Genetics Department (pp. 14-18).

Mutation

Mutations of the genes of *Oenothera organensis* are of two kinds, permanent and temporary. A further example of permanent mutation is reported, the X-ray induced mutation from S_4 to S_4' . Temporary mutation, due to a spontaneous or induced change which enables the pollen grain carrying the mutated allele to pass the incompatibility sieve immediately after mutation, disappears completely by the next generation.

A higher ratio of visible to sex-linked lethals has been induced in *Drosophila* by P^{32} than by any other means.

Selection

Experiments on selecting for high and low chaeta number in *Drosophila* have shown that: (1) selection in the direction of high number is more efficient when made on the male than on the female; (2) selection in the direction of low number shows no differences between the sexes in efficiency; and (3) a line selected at the mean of each generation has a mean level which gradually drops.

Work on rye has indicated that between 6 and 36 individuals per generation of a cross-pollinating plant are sufficient to maintain the standard and vigour of a variety.

In experiments on cabbage, the varieties are maintained by lines of 2, 5, 10, 25 and 50 plants selected from 100 plants on the basis of head characters. After only one year the most rigorously selected lines are superior to the unselected line.

Self incompatibility

The survey of the Cruciferae for self incompatibility now includes representatives of 20 genera and has shown that self incompatibility occurs throughout the family. In *Iberis* successful pollination is followed within 48 hours by the flushing of the stigma and style with purple anthocyanin. The compatibility relationships found in the turnip closely follow the sporophytically controlled pollen behaviour recently reported by American investigators in the Compositae (cf. Absts. 100 and 551). Self incompatibility has been discovered in *Lilium formosanum*, *Michauxia campanuloides* and *Oenothera speciosum*.

Male sterility

Genetical work is being carried out on natural and induced male sterility. In *Silene inflata* both parents are of equal importance in determining male sterility; control of this character is therefore polygenic rather than cytoplasmic. In *Origanum vulgare* male sterility appears to depend upon the combined effect of a recessive gene and a cytoplasmic difference. Male sterile plants of the tomato are under investigation.

Crossing and varietal contamination

A survey of French bean varieties has shown that many of them are genetically variable, even in the character of seed weight, used by Johannsen in his study of pure lines. Canadian Wonder is especially variable; previous work has shown that this bean is one of the varieties most prone to crossing. Much of the variation between seedsmen's stocks therefore probably results from intervarietal hybridization.

The amount of cross fertilization in the swede, a self compatible crop, has been estimated to be about 25%. The reduction in contamination with isolation distance in both swede and cabbage is similar to that previously observed in insect pollinated crops (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1442).

Breeding self fertile fruits

The technique of inducing self fertile mutants by X-ray treatment, developed with *Oenothera* (*Plant Breeding Abstracts*, Vol. XX, Abst. 730), has been applied to sweet cherries, apples and peas. Among the seedlings produced by X-irradiation and self pollination, some of the cherries have flowered. These seedlings set fruit on selfing and were compatible, as pollinators, with their parental varieties. Thus a primer, rather than a specifier, part of the gene *S* was destroyed upon the occurrence of the self fertile mutation. The seedlings were crossed with several good varieties, from which it is expected that large populations of self fertile seedlings will be obtained for selection of desirable fruit characters.

Rogue tomatoes

Two early lines selected from rogue plants which had been derived from seed germinated at a high temperature (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 7) gave yields, in the first three weeks of picking, nearly double those of a normal plant selection of Ailsa Craig and the stock seed of this variety. Further work is in progress to discover whether early lines can be obtained in other varieties by the same method.

Darlington, C. D. Cytology Department (pp. 19-24).

Chromosome breakage

In experiments on *Vicia Faba*, maleic hydrazide has been found to exert a more specific effect in breaking the chromosomes at particular and recognizable places than any substance previously studied (cf. Abst. 1576).

Spontaneous breakage has been observed in pollen mother cells of *Scilla sibirica*. Pairing is delayed and chiasmata are not formed; instead two chromosomes break up into 20 to 50 fragments. Although metaphase is reached at the same time as in neighbouring cells no pollen grains are formed. Possibly, slight differences in permeability of the walls of adjoining cells during a critical period at the beginning of meiosis are connected with this aberrant behaviour. An analogous breakdown of spindle formation at meiosis has been observed in *Passiflora Allardi*.

Luzula

The direct effect of X-irradiation on meiosis in *L. purpurea* ($n = 3$) was investigated. The results confirmed the observations of Portuguese workers that the centromere system is diffuse and that the first division of meiosis is equational (cf. Abst. 756). The X-irradiation resulted in two abnormalities due to the physiological effect upon the spindle: failure in pollen mother cell division and true interlocking of the chromosomes.

Chrysanthemum

Bud sports have been found to be associated with loss or gain in chromosome number. A survey of chromosome numbers has been made in the genus.

Rosa

Chromosome counts have been made on *Rosa* spp. Among native forms several plants have been found with numbers of $2n = 34, 37$ and 39 , instead of the balanced one of $2n = 35$. *R. Wilsoni* most probably arose through hybridization between the pentaploid *R. canina* and the tetraploid *R. spinosissima*.

Other chromosome studies

Different levels of polyploidy have been detected in *Gasteria*, *Aloe*, *Haworthia* and *Mesembryanthemum*.

2419. AUFHAMMER, G.
Erfolge und Ziele landwirtschaftlicher Pflanzenzüchtung. (**Achievements and aims of agricultural plant breeding**).
Landw. Jb. Bayern 1950 : 27 : No. 2 : 66-82.

The results of plant breeding in Germany over the last 50 years are reviewed. Selection within the old land races effected an improvement in yield and quality, accompanied however by greater cultural requirements; these were higher still in the new hybrid varieties and their general introduction was only made possible by a gradual rise in the level of farming. In the most unfavourable locations the land varieties still do better and a special task for the breeder might be to breed varieties for these areas. Each particular area would require its own special varieties, adapted to its own particular disadvantages. The importance of efficient seed production in maintaining agricultural yields is emphasized. Among the most outstanding achievements of plant breeding mentioned are winter barleys yielding up to 60 centners per ha.; pale-seeded soya beans with satisfactory seed yield; an improved winter rape yielding 9% more seed than the land variety; a summer rape with larger leaves useful for fodder after harvesting the seed, the yield of which equals that of winter rape; poppies with improved seed yield, earliness and standing capacity; red clover with 28% higher hay yield and 24.8% higher protein yield; lucerne with 17.6% higher hay and 25.5% higher protein yield; many new disease-resistant varieties such as mildew-resistant barleys and wheats, potatoes resistant to wart and blight biotype A; some 20 potato lines possessing a certain degree of resistance to Colorado beetle; some promising red clover selections resistant to clover rot; eight winter and eight spring wheats classed as high in quality and yield, which now occupy 25-30% of the wheat land of Bavaria; and barleys with $\frac{1}{2}$ -1% less protein content combined with mildew resistance.

Among the new developments which have contributed towards plant breeding, mention is made of quick methods of chemical analysis, which made it possible for instance to find sweet lupins; the methods of producing artificial mutations, which have given stiff-strawed barleys and oats and are being applied on an increasing scale at Weihenstephan; and artificial polyploidy, whereby it has been possible to make radishes with three times the yield of ordinary radishes, drought-resistant brassicas and other promising new forms.

2420. TSCHERMAK-SEYSENEGG, E.
Wien, der Ausgangsort des praktischen Mendelismus. (**Vienna, the source from which practical Mendelism spread**).
Z. Pflanzenz. 1951 : 29 : 262-75.

With the aim of stimulating other investigators to further work on the same problems, the

author gives a survey of his achievements during the last 50 years in Mendelian hybridization to combine desired characteristics in various economic plants. His results are shortly summarized with some suggestions on possible promising lines of future research. The crops reviewed include rye, wheat, spring and winter barley, oats, peas, bush beans, kidney beans, broad beans, scarlet runners, lentils, soya bean, beetroot, pumpkins, tomatoes, cabbage, carrots, onions and radishes. The author's work on the hybridization of races and species of garden stocks and on primula hybrids and hybrids of *Primula hirsuta* with auriculas is briefly mentioned.

2421. VILMORIN, M. DE.
Cent ans de sélection généalogique et cinquante ans de génétique appliquée à Verrières. (**A hundred years of pedigree selection and fifty years of applied genetics at Verrières**).
Z. Pflanzenz. 1951 : 29 : 288-301.

A review is given of the past and present work of the famous French firm of Vilmorin in plant breeding and applied genetics with special reference to cereals. It also contains a section dealing shortly with polyploidy in the breeding of industrial plants, cereals, forage crops and flowers; with heterosis; with breeding for disease resistance; and with the question of ecotypes of forage plants and the production of varieties suitable for different climates.

2422. Bericht über die Tagung der Fachgruppe "Pflanzliche Erzeugung" in Bad Schwalbach. (**Report of the meeting of the "Plant Production" group at Bad Schwalbach**).
Z. Acker- u. Pflanzenbau 1951 : 93 : 258-66.

The subjects discussed at this meeting are shown below.

- Sachs Untersuchungen zur Lumineszenzfrage bei Lolium.
(Investigations on the problem of luminescence in
Lolium). (pp. 259-60).

Pregerminated seeds from 36,000 plants of the F₆, F₇ and F₈ generations from *L. perenne* x *L. italicum* and *L. italicum* x *L. perenne* were studied as regards linkage between fluorescence and the characters, yield, winter hardiness, presence of awns, growth form, etc. The seeds showing fluorescence and those showing none under a mercury lamp were then planted and the results analysed. The differences found were too slight to make the use of the mercury lamp valuable as an aid to selection in diagnosing the tendency to survive winter conditions or in testing purity of seed.

- Scheibe, A. - Die Bedeutung der fasciata-Typen für die Erbsenzüchtung. (The significance of the fasciata-types for pea breeding). (p. 262).

Nine years of hybridization studies have made clear the genetic relations conditioning the crown type and the structure of the internodes. Practical advantages of the *fasciata* types in *Pisum* are the simultaneous overall flowering, simultaneous development of pods and seeds, and enhanced resistance to lodging.

- Boguslawski, v. Untersuchungen über den Zwischenfruchtanbau unter Berücksichtigung von Neuzüchtungen. (Investigations on the cultivation of catch crops with reference to new varieties). (pp. 265-66).*

The speaker dealt with suitable species and new strains of *Panicum miliaceum* and *Setaria italica* for growing on stubble fields. *Sorghum* hybrids, *Raphanus sativus* var. *oleiferus*, *Brassica juncea* and *B. niger* were mentioned as being of special interest.

2423. *APALJKOV, I. E. and
LITVINENKO, A. N.

(Creative cooperation between the scientific staffs at agricultural colleges and industry.)

Sovetskaja Agronomija (Soviet Agronomy) 1950 : No. 9 : 72-78.
[Russian].

The results of research at various Soviet agricultural institutes are surveyed from the Mičurinite viewpoint, the value of scientific achievements being assessed by the extent of their application in industry.

Reference is made to two new spring wheats, one winter wheat, one rye, one variety of perennial rye and a new sorghum hybrid from a cross involving *Sorghum halepense* as one parent, which were bred at various Soviet research institutes. Other economic plants developed recently include a new sweet lupin, a winter rape, a water melon grown for forage, a new potato variety Kazanec [Kazan], a new vine, a cabbage variety, Klykovskaja, and a variety of an Abyssinian species of *Crambe*.

2424. PESOLA, V. A.

Kurze Übersicht über die Tätigkeit der Abteilung für Pflanzenzüchtung an der Landwirtschaftlichen Versuchsanstalt Finnlands. **(Short survey of the work of the Plant Breeding Department at the Agricultural Research Institute of Finland).**

Z. Pflanzenz. 1951 : 29 : 282-87.

The history of plant breeding in Finland is reviewed, with information on the various research institutes concerned with the production of cereals, peas, meadow grasses and potatoes. Methods are outlined and recent successful varieties of wheat, oats, barley, peas, potatoes, meadow grasses, herbage plants, fibre crops, field beans and oil crops are described.

By induced polyploidy, rye x wheat hybrids, tetraploid ryes and tetraploid *Trifolium hybridum* have been obtained.

High yield, winter hardiness, resistance to drought, lodging and diseases are amongst the major aims in breeding. The causes of winter hardiness have been studied.

The methods of multiplication and the sale of new varieties from the Seed Centre in Jokioinen are explained.

2425. ÅKERMAN, Å.

Allmänna Svenska Utsädesaktiebolaget 60 år. **(The 60th anniversary of the General Swedish Seed Company Ltd.).**

Sveriges Utsädesfören. Tidskr. 1951 : 61 : 59-60.

The foundation of this organization and its role in the promotion of Swedish plant breeding are made clear in this note. The work of the company has already been extensively reviewed in *Plant Breeding Abstracts* (cf. Abst. 139).

2426. ÅKERMAN, Å.

Kort redogörelse för Sveriges Utsädesförenings organisation och verksamhet. **(Short report on the organization and work of the Swedish Seed Association).**

Sveriges Utsädesfören. Tidskr. 1950 : 60 : 427-31.

For the benefit of members and nonmembers present at this Kalmar meeting a concise account was given of the work of the Association, its sources of income and some of its recent achievements in the breeding of agricultural crop plants and its work on the induction of mutation in barleys.

* An extended summary of this paper is on file at the Bureau.

2427. ANDERSSON, G.
Sveriges Utsädesförenings årsmöte i Kalmar den 18 och 19 juli 1950.
(**The annual meeting of the Swedish Seed Association at Kalmar, 18 and 19 July, 1950**).
Sverig. Utsädesfören. Tidskr. 1950 : 60 : 417-26.

Å. Åkerman and O. Holmgren, among other speakers, gave an account of the organization, development and work of the Swedish Seed Association (cf. Abst. 2426) and of the Kalmar Station, with special reference to successes in the breeding of new varieties of cereals, clovers, potatoes, oil crops and sugar mangels. At Kalmar Station and at Svalöf the requirements in regard to resistance to pests and diseases receive full attention. A visit to the Nygård estate, recently acquired for the Swedish Seed Association, demonstrated the value of this experimental farm for the breeding of certain crop plants and for research on forest trees in collaboration with the Association for Forest Tree breeding.

2428. ÅKERMAN, Å.
Die schwedische Saatzüchtervereinigung. Organisation, Methoden und Erfolge der Pflanzenzüchtung. (**The Swedish Seed Breeders' Association—Organization, methods and achievements of plant breeding**).
Bodenkultur, Wien 1950 : 4 : 394-404.

The establishment and breeding methods used at Svalöf are outlined with observations on the production of new varieties of cereals, potatoes, root crops, forage plants, flax, hemp and oil yielding plants. A note on the testing and marketing of varieties concludes the account.

2429. MENDIOLA, N. A.
Agricultural research in Formosa before 1945.
Philipp. J. Agric. 1949 : 14 : 287-304.

A brief survey of research at the Agricultural Experiment Stations in Formosa from 1902 to 1945 includes notes of breeding work with the following crops: rice, cotton, flax, sugar cane, sweet potato, tung oil, *Cinchona* and pineapple.

2430.
Proceedings of the Seventh Meeting of the Crops and Soils Wing of the Board of Agriculture and Animal Husbandry in India held at Madras from the 7th to the 10th April, 1948 (1950) : Pp. 420.

Subject No. I. The need for breeding crop varieties adapted to varying levels of soil fertility and for special conditions of soil and climate. (pp. 10-18).

At the general meeting most of the discussion on the report of the subcommittee on the above subject centred upon the problem of whether a large number of specially adapted crop varieties or a smaller number of more widely adapted varieties should be aimed at, considering the diversity of soil and climatic conditions in India. Among the resolutions adopted was one recommending that the plant breeder should keep in view the development of varieties resistant to drought, frost, pests and diseases; and adapted to the broadly different soil and climatic regions, and in particular each soil type, irrigated and unirrigated conditions, and different levels of fertility. Another resolution passed recommended that experimental stations should be established in each of the recognized climatic and soil regions.

Subject No. II. The importance of rootstocks in the standardization of fruit tree material. (pp. 24-28).

The resolutions passed at the general meeting which discussed the report of the relevant

subcommittee included one dealing with the selection of trees of acclimatized varieties, bud selection to eliminate off types and determination of the best scionic combinations for each important region.

Subject No. III. Cereal rusts and their control.
(pp. 29-40).

The recommendations passed included proposals for intensive work on physiological races of wheat rusts, and continuation of the work of intergeneric and interspecific hybridization being carried out at the Indian Agricultural Research Institute with the aim of evolving wheat varieties each combining resistance to all three rusts.

Subject No. VI. To review the measures adopted to increase the fodder production. (pp. 65-72).

Collection of indigenous and foreign fodder crops and their trial under local conditions and also improvement of existing fodder crops were among the activities referred to in the resolutions adopted.

Reports of subcommittees. (pp. 82-111).

The reports of each of the subcommittees, discussed in the first section, are presented.

Appendix I. Subject No. 1. (pp. 113-92).

Notes were contributed by the following at the meeting of the subcommittee on the above subject:—

Tamhane, R. V. (pp. 114-16).

The importance of developing varieties suited to the different tracts in India is analysed, and exemplified by cotton, sugar, legumes and other crops.

Pal, B. P. and Parthasarathy, N. (pp. 116-19).

Varietal testing in India has tended to be restricted to a single level of soil fertility believed to typify the locality in question. More extensive trials in localities representing the different climatic and soil conditions are advocated. Plant breeders should also pay attention to sound farming practices and to economic returns, in conducting variety tests.

Asana, R. D. (pp. 120-23).

Environmental factors affecting the performance of wheat in India are discussed. The following lines of investigation are suggested as preliminary steps in a breeding programme aimed at producing varieties suited to the different regions: (1) range in tillering in varieties, especially of early and medium types; (2) influence of temperature and soil moisture on tillering; (3) effect of temperature and soil moisture on growth after ear emergence and on ear characters; and (4) interaction of different levels of nutrition with length of growth period.

Mukerjee, B. K. (pp. 123-26).

Problems of sugar cane breeding in the United Provinces are examined. The need for sugar cane experimental centres corresponding with the different soil and climatic conditions is stressed. Classification of the climatic and soil regions is required to put breeding work in India on a sound basis: climatological classification of the United Provinces has already been made. Each soil tract within a particular climatic belt should form the unit for work on breeding and selection. Study of the relationship between root formation and the soil, still in a preliminary stage in the United Provinces, is important. Attention should also be given to the discovery of varieties producing an increased return for every pound of nitrogen added to the soil; at Shahjahanpur a significant interaction has been found between variety and level of fertility.

Chavan, V. M. (pp. 126-30).

Breeding work is discussed in relation to environmental conditions, with particular reference to crops in Bombay Province. The importance of devoting sufficient attention

to physiological characters is emphasized and much earlier and more extensive testing of breeding material advocated. Furthermore, collaboration between meteorologists and plant breeders in making phenological observations on crop behaviour and between plant breeders and workers in other branches of science is recommended.

Banerjee, E. A. R. (p. 129).

The diversity of soil and climate in West Bengal and the need for adapted strains of rice are considered.

John, C. M. (p. 138).

The importance of local adaptation is illustrated by examples of oilseed crops in India. Regional organization of breeding stations is urged.

Narsinga Rao, M. B. (pp. 138-41).

Rice production in Madras is discussed with reference to breeding for special conditions of the soil, breeding for blast resistance, maintenance of soil fertility, and soil fertility in relation to rice quality.

Balasubramanyam, R. (pp. 141-42).

The view is expressed that a multiplicity of varieties must be avoided as far as possible and work concentrated on improvements in soil management rather than breeding varieties with limited adaptability. In cotton improvement in Madras, strains suitable for greater environmental diversity are being produced for both irrigated and unirrigated conditions. A wider hybridization programme involving the use of varieties which have undergone long spatial and ecological isolation is likely to provide the required variability for selection of widely adapted strains. Exploitation of hybrid vigour will also result in crop varieties with wider adaptation, particularly in self-fertilized species.

Harchand Singh, S. B. (pp. 142-43).

The increased production resulting from the use of Coimbatore varieties of sugar cane and of new varieties of wheat, rice and cotton in Patiala is pointed out.

Ekbote, R. B. and (pp. 143-45).

Dhodapkar, D. R.

In experiments in Berar and the Central Provinces wheat varieties have exhibited a differential response to manuring. Crop strains should be developed which give the best performance under a given soil condition; the levels of fertility taken into account should however have a broad basis.

Appendix II. Subject No. 2. (pp. 193-214).

Notes are given, dealing with selection of trees in acclimatized fruit varieties, selection of rootstocks and with other aspects of standardization of planting material, which were contributed to the relevant subcommittee.

Appendix III. Subject No. 3. (pp. 215-51).

In addition to the papers presented to the subcommittee on "Cereal rusts and their control" summarized below, K. M. Thomas reported on the rusts of wheat and other cereals in South India, with some reference to breeding problems, and C. Vijayaraghavan contributed a paper dealing mainly with work in Madras on the rust control of *Setaria italica* by selecting and breeding resistant strains.

Kulkarni, G. S. (pp. 216-19).

The occurrence of wheat rusts in India and the results of early breeding work on resistance are surveyed. It is recommended that breeding of high yielding and rust resistant wheats should be the chief objective in each Province or State where rust is a pressing problem.

Vasudeva, R. S. (pp. 220-27).

Methods of control of wheat rust are discussed, including breeding for resistance. Recently, research has been carried out on physiological races in India; it is mentioned that at

Simla work on the combination of resistance to all three rusts in a single variety is in progress.

Mehta, K. C. (p. 227).

Brief reference is made to wheat breeding work on rust resistance begun at Simla in 1935; pending the results of the breeding programme, various short term measures of rust control are put forward.

Mundkur, B. B. (pp. 227-78).

Attention is drawn to the difficulties of wheat breeding for rust resistance due to the occurrence of physiological races.

Pal, B. P. (pp. 237-49).

Wheat breeding for rust resistance in India and other countries is reviewed. Systematic breeding of rust resistant varieties was initiated in India in 1936, based on the information concerning physiological races obtained by K. C. Mehta. At Simla, a high degree of resistance to all the physiological races of each rust has been secured in separate wheats; synthesis of resistance to all three rusts is now being attempted by double crossing. In the Central Provinces and Bombay, work is concerned with resistance to black rust only. New sources of resistance to rust have been sought. The rust resistant species *Triticum Timopheevi*, *T. dicoccum*, *T. durum* and *T. Vavilovi* have been successfully crossed with *T. vulgare* or interspecific hybrids which may be indirectly valuable in breeding for rust resistance; promising selections have been obtained which show a high degree of resistance to certain individual rusts combined with good characteristics of the ear and grain. Wheat x rye and wheat x *Aegilops* have yielded useful material for further breeding. The difficulties and hopeful features of wheat breeding for rust resistance in India are indicated. The coordinated scheme for rust control sanctioned by the Indian Council of Agricultural Research is an important step forward.

Ekbote, R. B. and Sahasrabudhe, K. R. (pp. 250-51).

Wheat breeding for rust resistance is among the topics discussed. In India, the possibility of new races resulting from hybridization is negligible, since the rust fungi reproduce only in the vegetative stage from year to year. Mutation may occur, but not to any appreciable extent. Intensified breeding and research on fundamental problems of rust races, such as mutation, are advocated.

Appendix VI. Measures adopted to increase the fodder production. (pp. 360-402).

In addition to the following contributions to the subcommittee on fodder production, C. Vijayaraghavan reported on the potentialities of millets as fodder crops with special reference to Madras Province and described selection and hybridization carried out on sorghum in this Province.

Kumar, L. S. S. (pp. 361-65).

In Western India no work has so far been carried out on selection and improvement of cultivated perennial grasses. Selection of superior types of indigenous grasses and legumes, followed by seed multiplication on a large scale, is recommended. The possible value of some introduced grasses and legumes is discussed.

Sen, K. C. and Ray, S. C. (pp. 366-69).

Indigenous and introduced fodder species are considered. Among indigenous grasses, Guinea grass (*Panicum maximum*) is suggested as the most valuable for selection, on account of its chemical composition.

Chandrasekharan, S. N. (pp. 371-79).

The following are among the suggestions made for increasing fodder production: extensive collection of promising grasses in India; detailed study of selected types; breeding of

valuable strains with high yield and nutritive value; and collection and trial of exotic grasses and legumes.

Mirchandani, T. J. and (pp. 379-87).
Dabadghao, P. M.

The proposed programme of work on fodder and forage crops at the Indian Agricultural Research Institute is given; it includes investigations of strains of species found promising and breeding of improved strains. Information on indigenous and exotic species under observation at the Institute is also provided. Selection of berseem (*Trifolium alexandrinum*) is in progress; selections of American varieties of soya bean are under observation.

Das Gupta, N. C. (pp. 388-89).

Selection of *Pueraria* species, *Cajanus Cajan* and lucerne is recommended.

Pal, B. P. and (pp. 391-96).
Singh, H.

The introduction of indigenous and foreign plant material as a means of increasing fodder production is discussed. Intraspecific, interspecific and intergeneric hybridization is advocated, examples being given of crosses which might provide valuable strains.

Narayanan, E. S. (pp. 396-97).

The importance of honey bees in seed production is described. Experiments at the Indian Agricultural Research Institute have shown that honey bees constitute the chief factor influencing seed setting in berseem.

2431.

Annual Report of the Agricultural Department, Orissa for 1946-47
(1950) : Pp. 169.

In addition to varietal trials of rice, sugar cane, potato and other crops at several centres the following work is reported:—

Rice

Selection was carried out at the Cuttack, Berhampur and Jeypore Farms. At Berhampur genetical study of black rice hybrids continued; hybrids of Bayahunda wild rice were selected for drought resistance.

Cotton

Selections of Garo hill cotton with long bolls are among the types showing promise at Cuttack; they are to be multiplied for distribution to growers.

Jute

New strains are being extensively tested.

Sugar cane

At Cuttack selection is in progress.

Turmeric

Samples from Orissa and elsewhere were tested.

Citrus

Selection and the production of uniform stock seedlings are under way.

Coconut

Data are given on the characters of trees selected in the villages as sources of seed nuts.

Pulses

Selection of mund (*Phaseolus radiatus*), biri (*Ph. Mungo*), kulthi (*Dolichos biflorus*) and arhar (*Cajanus indicus*) is reported.

2432.

**Annual Administration Report of the Department of Agriculture,
Uttar Pradesh for the year ending June 30, 1949 (1950) : Pp. 125.**

Wheat

Further crosses were made to develop a high yielding, good quality wheat with early maturity and resistance to rust and lodging. None of the NP hybrid selections has shown superiority over the standard Pb. 591 in the western districts. X-ray mutants developed by Ranjan were tested (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 880); no significant differences between these and NP 52, Pb. 591 and C 13 were detected.

Maize

Selection is in progress. A scheme has been initiated to estimate the breeding value of inbred lines developed from local and introduced varieties and to test American hybrids.

Barley

Hybridization continued. In preliminary trials of selections from previous hybrids some have given a promising performance but none is earlier than the standard C 251.

Rice

Work on breeding high yielding, early maturing, hardy varieties continued at Nagina; crosses were effected between local types and very early Russian strains. Indigenous red rices with high nutritional value have been collected in the eastern districts.

Panicum Crus-galli

The sawan strains 25 and 46 have shown superiority in yield.

Sorghum

Breeding to develop improved strains suitable for Bundelkhand is required. Selection of types for unirrigated conditions continued.

Potato

None of the hybrids from Simla outyielded the local strains.

Sugar cane

At the Shahjahanpur and Gorakhpur stations seedlings have been raised from hybrid fluff received from Coimbatore. The results of varietal trials at these two stations and at Muzaffarnagar are summarized. Information is given on varietal reactions to diseases and pests at the former station.

Mustard

The rai type Et. 3/2 is a high yielding variety suitable for mixed cropping with wheat, recommended for the western districts; RT 11 and T 4 show promise for the central and eastern districts respectively. The yellow sarson type AGH-A, a selection from Aligarh, is recommended for the western region.

Linseed

Improved hybrid selections are being studied.

Fibre crops

Strains of desi and American cotton developed by hybridization are under trial. Breeding work on other fibre crops is to be organized.

Tobacco

A breeding programme is desirable. Tobaccos collected in India are to be studied.

Fruits

Varietal trials have been initiated.

Pulses

Type 87 of gram (*Cicer arietinum*) shows superiority in yield and quality in some districts; it has been crossed with other selections. Soya bean selections were made at Tarikhet. Early strains of urd (*Phaseolus Mungo*) and an early variety of mung (*Ph. aureus*) show possibilities for double cropping with wheat and are being multiplied. The wilt resistant strain of arhar (*Cajanus Cajan*), 17W/2, has been chosen for multiplication to replace the susceptible strain 66; selection of other resistant types continued.

2433. AHLAWAT, M. R.
Punjab.
Indian Fmg 1950 : 11 : 349-50.

Cotton

Breeding work on American cottons and seed distribution have been undertaken in view of the changes in the cotton acreage resulting from partition. The district of Ferozepore, where canal irrigation facilities exist, has been found to be very suitable for growing American cotton; LSS is especially suitable and pure seed is being produced. For irrigated areas in the southeastern districts of the State, the early American strain Haryana (216F) has already been released. The possibilities of growing long staple cotton in the submontane area are being explored.

Mung

Varieties 54 and 305 are recommended for cultivation in the plains. The selection 1/49, tested at Kulu, about 4,000 ft. above sea level, has outyielded the local variety by 89.4%, has larger beans and excellent cooking quality.

2434. S., R.
New schemes of agricultural research.
Indian Cott. Gr. Rev. 1950 : 5 : 378-79.

The following new schemes have been sanctioned by the Indian Council of Agricultural Research: rice breeding in West Bengal, East Punjab and Coorg; development of improved maize strains for the hilly tracts of West Bengal and plains of Bihar; production of hybrid seed of cumbu (*Pennisetum typhoideum*) in Madras state; control of *Striga* on sorghum in Madras by breeding resistant varieties and by chemical measures; pulse breeding in West Bengal; several schemes on edible root and tuber crops, including the survey and collection of indigenous and introduced varieties and the breeding of varieties with improved yielding capacity and nutritive qualities; research on the environmental factors conducive to seed setting in kudzu and comparative study of the palatability and other characters of *Pueraria* spp. at the Agricultural Research Institute, New Delhi; fodder trials of various trees, shrubs and grasses in Jaipur; study of introduced milk yielding trees of *Brosimum Galactodendron* in Bombay; and collection of ginger varieties from the west coast and breeding of high yielding chilli varieties resistant to thrips in Bombay and Madras.

2435. **Scientific Reports of the Indian Agricultural Research Institute,
New Delhi for the year 1947-1948 : Pp. 182.**

Plant introduction

Indigenous wild plant material was collected in Orissa, which included *Solanum* spp. Orissa appears to be particularly rich in *Solanum* spp. and varieties. Information is given on the grasses, legumes and other crops introduced from foreign countries and on introductions studied during the year under review.

Wheat

Progenies of interspecific and intergeneric crosses were selected.

Breeding for rust resistance continued. Selections from crosses made originally at Simla were subjected to a preliminary yield trial; most of them exhibited a high degree of rust resistance. The early and medium selections yielded comparatively better than the controls NP 4 and NP 114. The late maturing selections formed good grains although their yields were slightly lower; these late maturing wheats might be useful in regions with longer growing periods. The progeny of the synthetic cross W 375, made with a view to combining resistance to all three rusts, was tested for adult plant resistance; selections were made for further study. Some wheats from the USA showed promise as future breeding material.

Out of 66 hybrid strains, developed at Simla, which were studied for resistance to loose smut, 44 showed complete resistance.

The new NP wheats of hybrid origin were tested for yield in 17 localities. Compared with the local strains they gave a good performance at each centre; some exhibited a high degree of rust resistance.

Study of the inheritance of extra glume, branched ear and glume colour was continued in progenies of *Triticum vulgare* x *T. Vavilovi* and *T. Vavilovi* x *T. sphaerococcum*.

Ten varieties were subjected to drought conditions in a pot wilting experiment; data are given on tillering, time of ear emergence, spikelet number per ear, grain number per spikelet, 1000 grain weight and grain yield.

Varietal differences in the contribution to grain weight by assimilation in the ear are noted. It is suggested that the relatively greater drought resistance of NP 710, observed in the pot wilting experiment, may be due to the greater contribution by its ear to grain weight; the high assimilatory capacity of the ears would confer an advantage on this variety, especially under drought conditions when translocation would probably be less intense.

Maize

Work on the production of hybrids continued. Studies of the comparative merits of selfing and sib-mating, extent of homozygosity required, convergent improvement and other aspects were carried out. The F_2 generation of the cross between maize and teosinte was selected mainly on the basis of suitability for fodder.

Potato

Several new hybrids have shown considerable promise in yield trials, compared with the chief commercial varieties Phulwa and Darjeeling Red Round; they appear to be fairly tolerant of virus diseases. At Simla introductions from the Commonwealth Potato Collection, England, were studied with regard to their potentialities as breeding material and their immediate value. Breeding for late blight resistance continued. Strains resistant to this disease and possessing good tubers are now available for regional trials.

Luffa acutangula

Observations on crosses between hermaphrodite, monocious and andromonocious plants have revealed that two loci, each with a multiple allelomorph series, are involved in the inheritance of sex forms.

Sugar cane

Hybridization carried out at Coimbatore included the following: (1) bulk crosses of Co. 449, Co.527, Co.534 and Co.617, and semibulk crosses involving these four varieties and several others; (2) experimental crosses for evaluation of parents; (3) sorghum crosses; (4) crosses of Napier grass (*Pennisetum purpureum*) as female parent with Co. 285, Guinea grass (*Panicum maximum*), Johnson grass, G 1051, *Narenga porphyrocoma*, *Saccharum spontaneum* and G 6331 (Johnson grass x Guinea grass), made with a view to developing fodder types; and (5) experimental crosses to determine the value of certain canes as parents for the production of chewing types. The seedlings obtained from hybridization with Napier grass are so similar to Napier grass in vegetative characters that possibly they are parthenogenetic in origin.

In material obtained from previous crosses, it has been noted that seedlings with economically desirable characters have originated from the crosses Co.270 x Co.301, Co.464 x Co.301, Co.464 x Co.453, POJ 2878 x Co.371 and POJ 2878 x Co.453. Of these Co.270 x Co.301 was the most valuable cross, producing seedlings with good tillering capacity and juice quality and nonpithy core.

A list is given of 30 new Co. canes released, indicating their parentage and characteristics. Breeding technique is being studied with reference to cultural practices in the first and second ground nurseries.

The effect of different planting periods on the yield and quality of varieties is under investigation.

Physiological studies comprised: the chemical composition of flowering and nonflowering varieties; photoperiodic experiments on different varieties; and the effect of irrigation and manures upon flowering and nonflowering canes.

The reaction of Co. canes and varieties of *S. spontaneum* to red rot (*Colletotrichum falcatum*) is being studied.

The *Ravennae* group of *Erianthus* types, characterized by narrow leaves, has $2n = 20$ chromosomes; both wide and narrow leaved forms exist among the polyploids. Possibly the polyploids evolved as a result of hybridization between the wide and narrow forms. Progenies from crosses between the different types are being subjected to cytological analysis.

The presence of an awned fourth glume in a few types of *S. officinarum* has been considered as a possible indication of the part played by *Erianthus* in the evolution of cultivated canes. An F_1 seedling of the cross between *N. porphyrocoma* and *Sclerostachya fusca* possessed an exserted awn, a feature characteristic of *Erianthus*. A fuller study of the interrelationships of the various genera is required.

One of the basic complements of $x = 5$ in *S. officinarum* is regarded as homologous with chromosomes in *Sclerostachya*. With a view to discovering the homology of the other complement, further intergeneric crosses have been made.

The nature of the functional gametes in *S. spontaneum* has been investigated. In crosses of this species with Johnson grass and sweet sorghum, evidence was obtained that an unreduced gamete ($n = 64$) and a reduced gamete ($n = 32$) respectively had functioned. Crosses and back crosses with *S. spontaneum* as female parent and *S. officinarum* and species of allied genera as male parents have been effected, in an attempt to obtain seedlings with a haploid complement of *S. spontaneum*.

Wild forms of *Saccharum* and allied grasses have been collected from the forest areas of South India.

Tobacco

Breeding for high nicotine content in *Nicotiana rustica* continued. In a preliminary yield trial, three new hybrid selections were superior to the control, NP 18, particularly in yield, leaf colour and leaf puckering; analysis of the nicotine content of these selections is in progress.

Reciprocal differences in vigour of most morphological characters were observed in the F_1 progenies of the cross Ambalema and Bonhrie.

A study was made of the tetraploid of *N. glauca* obtained as a result of grafting a tomato scion and subsequent decapitation; the gigantism usually associated with tetraploidy was not evident; both pollen grains and stomata were however larger than in the diploid form.

Chilli

Promising selections have been secured from a cross between an Indian variety and Hungarian type.

The C_{10} progenies of tetraploids of NP 51 and C_3 progenies of four other types were compared with their corresponding diploids for fruiting ability, fruit size and seed setting; suitable plants were selected for further study. Intervarietal tetraploid crosses have been successfully carried out; the effect of hybridity upon sterility is to be analysed in the F_1 . The nature of the functional gametes in asynaptic plants is under investigation; cytological study of male sterile and triploid plants is also in progress.

Brassica spp. and Eruca sativa

Continuous inbreeding of toria and sarson (*Brassica campestris*) resulted in stunted habit and loss of vigour, and finally in failure to produce seed.

Further crosses were carried out to confirm whether male sterility in toria is governed by two factor pairs.

Male sterility in a mutant of taramira (*Eruca sativa*) depends upon a single factor pair. Inheritance of self sterility in this species is under investigation.

Progenies from single plant selections and crosses of colchicine induced tetraploids of several species of *Brassica* were studied with regard to morphological characters and fertility. In toria, selection of tetraploids for fertility has resulted in an increase in frequency of plants with high fertility in the entire population. In some cases the maximum fertility of the plant was higher than that of the parent; such plants have been selected and further selection work will be concentrated upon their progenies. Cytological behaviour does not appear to have any direct influence upon degree of fertility in tetraploids of *B. campestris*.

Intercrossing of promising tetraploids of toria was effected.

The progeny of the tetraploid form of *E. sativa* is composed of tetraploids, triploids and aneuploids. Crosses between plants with different chromosome numbers were made to study the nature and causes of reversion of the tetraploid to the diploid condition. Crosses were carried out among the tetraploids of *Brassica* spp. and *E. sativa* to investigate the possibility of producing amphidiploids directly.

Sesamum

In the sixth generation of the amphidiploid *S. orientale* ($2n = 26$) x *S. prostratum* ($2n = 32$), as in previous years about 6% of the plants were sterile and resembled the original F_1 hybrid; these plants have evidently arisen through haploid parthenogenesis.

Work is being carried out on the utilization of *S. prostratum* for breeding commercial strains of *S. orientale* resistant to phyllody and the caterpillar *Antigastra catalaunalis*. In a study of the triploid hybrid ($2n = 42$), obtained by back-crossing the amphidiploid, *S. indicatum* ($2n = 58$), to *S. orientale*, the Drosera type of chromosome pairing, 13_{II} and 16_I , was confirmed; but a few trivalents were observed. Plants in the progeny of the triploid and in the reciprocal cross *S. orientale* x triploid were examined for chromosome number and other characters. In the majority of plants the chromosome number was $2n = 26$; a few plants with $2n = 26 + 1$ were however identified. Most plants resembled *S. orientale* but the transference of some features of the wild species, e.g. capsule characters and seed colour, was evident. A haploid plant was discovered in the progeny of an *S. orientale* triploid.

The chromosome number of *S. laciniatum* is reported to be $2n = 32$.

Failure of the cross *S. radiatum* x *S. orientale* and its reciprocal is due to disintegration of the endosperm.

Safflower

Wild types (*Carthamus oxyacantha*) are being sought for use in breeding.

Linseed

Testing and selection for resistance to rust (*Melampsora Lini*) are in progress at Delhi and Karnal. A large number of strains were free from infection at both stations, including the foreign introductions used as parents in breeding. F_3 progenies of crosses between very early types from Bengal and late maturing, rust resistant strains were selected.

Tomato

Some selections from *Lycopersicon esculentum* x *L. pimpinellifolium* are superior to commercial varieties, since they possess early maturity, good yielding ability, high vitamin C content and attractive flavour. Small size of fruit is associated with good flavour and high vitamin C content; but small fruit size has not adversely affected the popularity of the selections among consumers. A number of the new strains can be sown as early as June. In order to secure further improvements, progenies of crosses between the best selections are under selection.

The F_1 of the cross between normal plants and a male sterile mutant with thick leaves showed dominance of the normal leaf character and of male fertility.

Egg plant

Selections of *Solanum Melongena* x *S. incanum* and *S. xanthocarpum* x *S. Melongena* have been obtained which are almost free from the bitterness of the wild parents.

Hibiscus esculentus

Hybridization between *H. esculentus* and five other species was attempted. Commercial varieties of lady's fingers were studied to evaluate their potentialities for breeding.

Broad bean

Further selections were made for early setting, large pods and productivity in F_4 progenies of crosses between the varieties Broad bean and Raharia seem.

Gram

C_9 progenies of the tetraploid form of NP 25 were selected.

Cajanus Cajan

Cultures of the pigeon pea were further selected on the basis of resistance to wilt (*Fusarium udum*), maturity and other characters. Some of the material derived from

the cross between NP 69 and NP 132 showed no wilt infection. In the Burma collection, New Era 40-6 was free from wilt disease, as in the previous year. Data from the cross between normal plants and a mutant with simple leaves and sepaloid flowers indicate that leaf type and floral character depend upon a single gene pair.

2436. HANDIQUE, L. K.

Annual Report of the Department of Agriculture, Assam, for the year ending 31st March, 1949 (1950) : Pp. 449.

Demonstrations in the form of varietal trials are reported from many farms and experiment stations in different localities with crops such as wheat, maize, barley, rice, millet, forage grasses and legumes, potato, cotton, jute, *Luffa acutangula*, sugar cane, tobacco, red pepper, mustard, sesamum, linseed, tree fruits, groundnut and soya bean.

Rice

The segregating ratios of leaf colour are recorded for four generations from a cross between Latisail (green) and S 670 (full purple) at the Karimganj station. Further investigations will be continued with successive generations.

At the Titabar station several crosses have been made with summer and winter varieties in attempts to develop hybrids with high yields of good quality. The hybrid SC 307-473-2 appears to be promising; it has outyielded the established variety Loudumra.

Cotton

The report of the Cotton Research Station in the Gara Hills contains a reference to the selection of lines, from the Mikir, Naga and Gara Hills, approaching the ideal type which should produce high yields of short, coarse cotton with a high ginning percentage.

Hibiscus

The possibilities of increasing the cultivation of *Hibiscus Sabdariffa* var. *altissima*, as a substitute for jute in the Jorhat area, are being investigated.

Citrus fruits

A classification of citrus fruits indigenous to Assam comprises 17 species, one being newly discovered, 52 varieties within these species and 7 hybrids originating by natural cross pollination.

The relative merits of five local citrus varieties, used as rootstocks for propagating Khasi orange at the Burnihat station, were measured by the growth tendencies of the scion in respect of height, girth, spread of branches and yield; the variety Soh-Myndong [Rough Lemon] induced superior growth. Results of additional tests to determine whether the stock influences the juice quality of the scion indicate that the seasonal climatic fluctuations are the controlling factors.

Yield records of clonal progeny of Khasi orange trees from four localities are compared. Numerous introduced varieties, propagated on Soh-Myndong stock, are being observed for their adaptability to the conditions at Burnihat.

Beans

During a trial at Kokilamukh of *Phaseolus Mungo* for pure line selection it was observed that a few plants seemed less susceptible to leaf spot than the majority, which were severely infected. Several lines in trials of *Ph. radiatus* appeared promising in respect of habit, dates of flowering and maturity, pod character, seed size and seed colour.

Thirteen new selections of *Cajanus Cajan* were made in the Kokilamukh area as a preliminary to the isolation of pure lines. Many varieties introduced from other provinces proved to be as susceptible to *Fusarium* wilt as local forms.

2437. VENKATANARAYANA, G.

Annual Report of the Agricultural Research Station, Nileshtar II, 1947-48 : Pp. 11.

Cotton

Of the five perennial varieties tested at the Nileshtar II Station, Madras, Moco gave the highest yield of seed cotton.

Coconut

Young progenies from crosses involving the following combinations of characters show promise: thick kernel x abundant production of female flowers and the reciprocal, and abundant production of female flowers x high yielding capacity. Progenies from crosses between the variety Tall as female parent and Dwarf have given a satisfactory performance. Progenies resulting from cross pollination are more vigorous than those obtained by selfing. Progenies of palms belonging to different yield groups, produced by cross, self and natural pollination are being compared; progenies derived from parents in the lowest yield group are the least vigorous; selfed progenies appear to be the weakest but differences associated with mode of pollination have not been significant in this experiment. Inter-varietal crosses of introductions are being studied with regard to hybrid vigour; Laccadive x Chowghat dwarf and World variety x Andaman dwarf exhibit promise. Other material under investigation includes progenies between intravarietal crosses of Tall trees showing regular bearing and Tall palms with irregular bearing. Work is in progress to discover whether any correlation exists between thickness of leaflets and vigour in seedlings. Distribution of Tall and Dwarf seedlings continued.

2438. RAMASWAMY, K. and
VENKATANARASINGA RAO, M. B.
**Annual Report of the Agricultural Research Station, Pattambi,
for the year 1947-48 : Pp. 19.**

Rice

Pure line selection and selection of hybrid progenies were carried out at Pattambi, Madras. A sample of Krasnodar rice, a type reported to grow without irrigation in Russia, was received for trial.

Cotton

Perennial types are under observation.

Vegetables

Crosses were made between the "Vellarimathan cucumber" and pumpkin. Selections of local cucumber are under test.

2439. ACHYUTHA WARIAR, U.
**Annual Report of the Agricultural Research Station, Kovilpatti,
for 1947-48 : Pp. 16.**

Pennisetum typhoideum

Single plant selection and hybridization of cumbu were carried out at the Kovilpatti Station, Madras.

Sorghum

Selection is in progress.

Cotton

Hybrid families showing improvements in ginning percentage and lint characters are under observation. Perennial cottons are being tested with a view to their possibilities for domestic cultivation.

Hibiscus esculentus

Breeding is reported.

2440. **Annual Report of the Agricultural Research Station, Hagari,
Bellary P.O., for 1947-48 : Pp. 18.**

Sorghum

Selections of the standard H 1 and other types were tested at Hagari, Madras. Further crosses were made between H 1 and the Bombay strains M 47-3, M 31-2, M 951-2 and M 35-1.

Setaria

Selection is in progress. Strains are under trial for field resistance to rust.

Cotton

In breeding work on *Gossypium herbaceum*, hybridization is being carried out between the local cotton H 1 and types from Bombay possessing fineness of fibre and high ginning percentage, with the object of improving the former variety. *G. hirsutum* breeding is also in progress. In addition, trial of early varieties of *G. arboreum* has begun, with a view to finding cottons showing improvements in ginning percentage and fibre properties compared with H 1 when grown in the hingari season. Perennial varieties are under observation.

2441. SESHADRI, C. R. and
NARAYANA, G. V.

**Annual Report of the Agricultural Research Station, Tindivanam,
for the year 1947-48 : Pp. 17.**

Cotton

Of the perennial varieties tested at Tindivanam, Madras, Barbadense II gave the highest yield of seed cotton.

Castor bean

Strains derived from varieties and crosses were subjected to further selection. F_2 and F_3 hybrid progenies were tested. The morphological characters of 139 inbred types were studied.

Sesamum indicum

Selections of varieties and hybrid progenies were tested. New crosses between selfed selections were effected to develop a high yielding white seeded type. The improved strains TMV 1, TMV 2 and TMV 3 are being multiplied for distribution.

Groundnut

Trials were carried out on hybrid selections of the spreading and bunch types.

2442. NARASINGA RAO, U. and
NAICK, K. C.

**Annual Report of the Pomological Station, Coonoor (Nilgiris),
for the year 1947-48 : Pp. 12.**

Pyrethrum

A trial of clonal progenies of 20 selected mother plants is in progress at Coonoor, Madras.

Fruits

Varietal trials of apple, pear, plum and other fruits were carried out. No correlation between the yields of selected individual plants of strawberry and those of their progenies has been obtained; it may not therefore be possible to develop high yielding clonal strains by multiplication of parents of known performance. The number of fruits produced by 100 uniform selections of cape gooseberry ranged from 21 to 202 per plant.

Vegetables

The cabbage Large Early Drumhead and the pea Darjeeling, introduced from Poona, gave a satisfactory performance. Experiments on cabbage seed production are reported.

- 2443.

**Annual Report of the Agricultural Research Station, Lam P.O.,
Guntur, for the year 1947-48 : Pp. 14.**

Maize

Selling of local types is in progress at the above station, Madras, to obtain material for the production of F_1 hybrids.

Setaria italica

The strain G 1 is being distributed.

Sorghum

Selections of yellow and red types for the early season and of yellow types for the late season were tested.

Chillies

Selection for yield, fruit colour, calyx shape, tolerance of thrips and other characters is being carried out. The perennial variety Sinaha is under observation.

2444. ABDUL SAMAD, A. and
RAMASWAMY, K.

**Annual Report of the Agricultural Research Station, Aduturai,
for 1947-48 : Pp. 34.**

Rice

Numerous trials of selections of varieties and hybrids are reported from the Aduturai Station, Madras.

Cotton

Moco and other perennial varieties are under observation.

2445. NARASIMHA RAO, M. P. and
NARASINGA ROW, M. B. V.

**Annual Report of the Agricultural Research Station, Maruter,
for the year 1947-48 : Pp. 23.**

Rice

Work on selection and numerous crosses at Maruter, Madras, is reported. Crosses between released strains and wild rice were attempted, in order to incorporate the insect and disease resistance of the latter in cultivated rice.

Cotton

Of the perennial varieties studied, Moco produced the highest yield.

2446. LAKSHMINARAYANA PANTULU, S. and
NARASIMHACHARYA, L.

**Annual Report of the Agricultural Research Station, Nandyal,
for the year 1947-48 : Pp. 15.**

Sorghum

Selection work on various types at the Nandyal Station is reported.

Cotton

Improved strains of desi cotton (*Gossypium arboreum*) are being developed. Crosses were effected to combine the high yielding ability of the promising new strains 5625-C, 6169-C and 5289-F with the good fibre length of 5966½-D and four other Coimbatore strains. The cotton 5966½-D has 27% longer staple than the standard N 14. In one bulk trial all 14 strains tested showed better ginning percentage than N 14. The *G. herbaceum* cotton N 2648-5/4 merits further trial. Bulk trials of Cambodia types were also carried out with the aim of discovering a widely adapted strain, suitable for the Siruguppa, Hagari and Nandyal districts; MA II and several other cottons showed promise.

2447. SARVAYYA CHETTY, C. V.

**Annual Report of the Agricultural Research Station, Samalkot,
for the year 1947-48 : Pp. 28.**

Rice

The results of yield trials of selections and varieties at the Samalkot Station, Madras, are summarized.

Sugar cane

Detailed information is provided on the characters of 35 Co. canes.

Plantain

Tables are given indicating the main features of some 30 varieties.

2448. VENKATANARAYANA, G.

Annual Report of the Agricultural Research Station, Nileshtar III, for the year 1947-48 : Pp. 8.

Cotton

Of the five perennial varieties tested, Moco produced the highest yield of seed cotton.

Cashew nut

Selected trees are under investigation.

Cucumber

Udipi x Kasaragod and Nileshtar x Udipi outyielded the other hybrids tested. In varietal trials during the last four years, Kasaragod has produced the best yields.

2449. SANKARA AYYAR, M. A.

Annual Report of the Agricultural Research Station, Palur, for the year 1947-48 : Pp. 30.

In addition to yield trials on Coimbatore sugar canes and on selections of varagu (*Paspalum scrobiculatum*), ragi (*Eleusine coracana*), rice and groundnut, the following work is of interest:—

Cotton

Breeding work on long staple varieties is being carried out in cooperation with the Coimbatore Station.

Gourd

Varieties and hybrids of ribbed gourds were tested. Among the latter, crosses of Ambasamudram with several other varieties showed promise.

2450.

Rapport sur les travaux de recherche effectués en 1949. (Report on the research carried out in 1949).

Bull. Serv. Bot. Agron. Tunis 1950 : No. 19 : Pp. 88.

Research was continued on mass selection in relation to yield; self fertility of wheat; and genetic studies of variations that have arisen in some wheat varieties, e.g. the mutations "compact" and "spatulate."

Plant Genetics Laboratory

Out of 7002 lines of soft and hard wheats, barleys and oats under observation for resistance to lodging and foot rot, 6156 were retained and sown in 1949.

In conjunction with variety trials, rust resistance was tested at the Genetics Station of the National School of Agriculture, Montpellier, and the Phytopathological Laboratory of the Botanical and Agricultural Service, Tunis. The results differed somewhat, partly owing to the occurrence of biological races of rust. Selection in the second and third multiplication was based on yield and baking value for the soft wheats, and on yield and resistance to lodging for the hard varieties. Two hard wheats retained for regional trials were D 115 (Derbessi x Biskri) x M'Rari I^r and D 117 Mahmoudi x M'Rari 9^{1r} 21.

In regional trials at 15 stations the hard wheat D 115 (Derbessi x Biskri) x M'Rari surpassed the control Araina 8 in 12 out of 14 trials. It has very short straw and a dense ear with small kernels and showed good resistance to lodging. In extensimeter tests it resembled the bread wheats. Another hybrid line, 967 Hedba x Kahla, obtained at the Philippeville School of Agriculture, is of interest for its yield. It has long straw but resists lodging and has attractive grain of a light colour.

Hybridization to improve the colour of the grain and semolina of hard wheats involved the sowing of 13,936 kernels obtained from the following crosses: Biskri x Mahmoudi, Mahmoudi x Chili, Chili x Mahmoudi, Chili x (Sindyouk x Mahmoudi) and Baroota x

Kenya 1189. A further 22 crosses, made to obtain doughs of good colour, included crosses of Chili, Kasserine, Mahmoudi 552, Biskri AC² and Sindyouk x Mahmoudi 870, all of which produce greyish dough, with the American variety Carlton, which gives a light yellow dough.

Six other crosses were made between Mahmoudi 552, Sindyouk x Mahmoudi 870, Chili and a new hard wheat selection with very short straw.

Fungous Diseases Laboratory.

Lines of hard and soft wheats undergoing selection were tested for resistance to *Puccinia graminis*. No line proved immune or very resistant, but various degrees of resistance were observed and in some lines the development of rust was retarded. Apart from Thatcher, the soft wheats showing resistance were early or very early varieties, e.g. Florence x Aurore.

Genetical and ecological studies on black rust were confined to the behaviour of susceptible lines and the search for a simpler test for resistance in the lines undergoing selection.

Market Garden Crop Laboratory

Tobacco

Imported varieties are undergoing selection and analysis of nicotine content.

Tomato

Selection of industrial tomatoes is proceeding. Varieties imported from Italy and other countries and the local population Canatella are undergoing selection on the basis of the quantity of dry matter, seeds and skin. From about 2000 analyses of 30 lines of Canatella it appeared that (1) small fruits contain more dry matter, but also more seeds and skin, so that fruits of large or average size are better for industrial use; (2) though long fruits contain more dry matter, varieties with round fruits are more productive and less subject to pistil rot.

So far, Canatella is the best type as the ripe fruits are perfectly suited for preserving and also do not crush easily.

Some lines chosen in 1947, e.g. line 3 Spherical, are so good that they are being grown on a large scale and seed is being sent to neighbouring countries.

Imported English and other early varieties are being tested for industrial use.

Other Crops

Tests of imported market garden crops included varieties of melons, peas, coriander, aniseed and hybrid maize.

Laboratory of Cereal Technology

The industrial value of selected lines of wheat was determined. Some mutants of Florence x Aurore proved superior to the control Ariana 8 in baking quality; and among the durum wheats the lines D 117 and TD 9 surpassed the control Mahmoudi 552. Out of 356 lines of Mahmoudi x Kokini D 77, 30% showed elasticity of the gluten above the average. Among the durum wheats undergoing regional trials, Chili, Mahmoudi 552 and Kasserine again retained their relative positions as regards milling quality, while on the basis of their doughs they were placed in the order Chili, Kasserine and Mahmoudi 552.

Koudiat 14, B DD 967, D 115 and D 116 from the 1949 harvest showed excellent grain quality as determined by the extensimeter, and by the 1000 corn weight and the low incidence of mealy endosperm. Research is in progress on a method of studying the resistance of durum wheats to the latter condition.

Laboratory for Fruit Tree Cultivation

From over 400 pollinations of Spanish apricot with the local varieties, Hamidi and Chèchi, only a small set was obtained.

Botanical Laboratory of the Colonial School of Agriculture, Tunis

Studies are proceeding of stocks and of the quality of the wine from a number of vines. Regional variety trials of vines obtained by hybridization have been continued and some new crosses have been made.

2451.

**Record of Investigations No. 1. Department of Agriculture,
Uganda Protectorate for the period 1st April, 1948 to 31st March,
1949 (1950) : Pp. 91.**

Maize

Varieties K 8 and K 3 have given high yields, maturing sufficiently early to allow cotton to be grown immediately afterwards.

Millet

The yielding capacities of five Eastern Province varieties of *Eleusine coracana* have been compared with that of the local Buganda variety.

Potato

The performance of over 100 varieties from the Commonwealth Potato Collection has been compared with local and English varieties. Promising South American strains are undergoing further tests.

Sweet potato

Data are presented on the yield and palatability of varieties in the Kawanda collection. Trials of 14 promising varieties are in progress.

Cotton

The resistance of cotton varieties to blackarm (*Pseudomonas malvacearum*) is being investigated. Plants with resistance have been divided into the following groups corresponding to the presence or absence of B_2 : (a) the lowest type of resistance from which B_2 is absent; (b) the middle resistance level dependent on the presence of B_2 ; and (c) a high degree of resistance which indicates the presence of other factors besides B_2 . The middle level of resistance has been found in varieties which do not carry B_2 ; this suggests the independent operation of other factors.

Varietal response to various types of damage is discussed, with particular reference to the semiclust habit by which recovery is facilitated.

Wilt resistance tests have been carried out.

Cassava

The results of an investigation of the effect of seven different dates of harvesting on the yield of seven varieties are presented with an analysis of variance. The cropping capacity of mosaic resistant strains always exceeded that of two susceptible varieties, Bitaminsini and Nakachachali.

Groundnut

At the Serere farm the varieties Busoga and B 227 are preferred for their ease of harvesting.

Peas and beans

The results of yield trials are reported from the Kawanda and Serere stations.

Soya bean

The American varieties Acadian, Volstate, Ogden, Avoyelles and Mamloxi have proved inferior to local standard varieties in respect of oil content; S 11 and H 49 outyielded the rest with 971 and 865 lbs. per acre, respectively.

2452.

**Annual Report of the Department of Agriculture Colony and
Protectorate of Kenya 1949 (1951) : Pp. 29.**

Pyrethrum

Breeding work is reported (cf. Abst. 1680).

Wheat

The highly disease resistant varieties Kenya Settler, Kenya Ploughman and 291 J Mark II have been released (cf. Abst. 935). Eight other wheats have been distributed to farmers for trial. The occurrence of a ninth race of *Puccinia graminis* var. *Tritici* is suspected.

Oats

Among the introductions tested, Sunrise, from Southern Rhodesia, gave a good performance in the first year of trial and is to be further studied.

Maize

Work on hybrid production has been resumed. Single crosses were made between inbreds developed previously; these crosses are to be used for double hybrids in 1950. A new programme of inbreeding has been initiated, using local and introduced material. Trials of hybrids from South Africa, Southern Rhodesia and the USA have indicated that imported hybrids are not likely to be successful in Kenya. Improvement by Harland's intragenotypic method is also in progress (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 26).

Barley

A large number of new introductions are undergoing trial and selection. The American barley Glacier (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 215) and Australian variety Research are giving good commercial results. The six-rowed variety Canadian Mariout, obtained from Southern Rhodesia, has been released; it is a strong strawed fodder barley suitable for the lower altitudes.

Sorghum

Work has begun on breeding dwarf varieties for combine harvesting and cultivation under drier conditions and on poorer soils than those suited to maize. Introduced dwarf and semidwarf varieties appear to be susceptible to local diseases and pests; hybridization between these sorghums and the disease resistant, tall local varieties is therefore to be undertaken.

Grass and legumes

Grass and legumes are under trial and selection.

Potato

The blight resistant varieties 914 *a* (12), 1082 *a* (28) and 1095 *b* (22), now grown commercially, have shown some blight as the result of the occurrence of a new form of the fungus, but continued to give good yields. Further stocks of 914 *a* (12) and 1427 *a* (8) have been imported and are being multiplied in isolation at high altitude.

Fruits and vegetables

Observational trials are in progress at Molo.

2453.

Annual Reports of the Department of Agriculture, Bechuanaland Protectorate Administration 1947 : Pp. 13; 1948 : Pp. 8; 1950 : Pp. 9.
(Mimeographed).

Cereals

A multiple maize hybrid is considered to be more suitable for the present level of African agriculture than a double cross, and a multiple hybrid developed at the Mahalapye Station is being increased for distribution. Pure lines of *Pennisetum typhoideum* are also being developed for the production of multiple hybrids. Indigenous grain sorghums are inferior to many introduced varieties; dwarf sorghums from the USA are especially promising.

Other crops

Pumpkin breeding is in progress. Varietal trials of sunflower, sesame, groundnut and field beans continued.

2454.

Report of the Secretary, Division of Agriculture and Lands, Southern Rhodesia, for the year ended 30th September, 1950
(1951): Pp. 17.

Maize

In trials, hybrid maize again outyielded open-pollinated varieties by approximately 25%. Commercial double hybrid seed is available for extensive distribution.

Sorghum and millets

Selections of dwarf and tall sorghum varieties are under trial at the Matopos Research Station. The production of dwarf types of millet for combine cutting and of tall types for silage is receiving attention.

Pennisetum

Valuable stoloniferous strains of Napier grass for grazing are being bulked.

2455. RATTRAY, A. G. H.

Annual Report of Experiments of the Agricultural Experiment Station, Salisbury for the Season 1949-1950.

Rhod. Agric. J. 1951 : 48 : 34-61.

Maize

Double hybrid maize seed, produced from inbred strains bred at the Station, was planted on a commercial scale in Southern Rhodesia for the first time during the season under review.

The results of a trial of single hybrids and another of double crosses are summerized, data being given on parentage, yield per acre, stand, shelling percentage, suckering, sheath cover and lodging resistance.

Velvet bean

Strain 42 outyielded Somerset and was selected for high yield of seed and pod.

Sunflower

In a trial of six varieties, Southern Cross and Mars gave the highest yields.

Soya bean

Strains were tested at different planting distances.

2456.

Proceedings of the 48th Annual Convention of the Association of Southern Agricultural Workers held at Memphis, Tennessee, February 5, 6, 7, 1951 : Pp. 190.

Harvey, C. *The differential response of alfalfa varieties to*
Schember, V. E. and *phosphate.* (p. 52).
Potts, R. C.

A highly significant interaction between lucerne variety and phosphate fertilizer has been noted at the Brazos Valley Laboratory near College Station, Texas. Most of the variance of this interaction could be attributed to variety Buffalo.

McCain, F. S. *The relation of oil content to yield and other*
 agronomic characters in maize. (pp. 64-65).

A barely significant negative correlation ($r = -0.16$) was found between the oil content and yield of single crosses. Small negative but nonsignificant correlations between oil content and date of silking ($r = -0.12$), oil content and date of ripening ($r = -0.07$), and oil content and moisture at harvest ($r = -0.12$) were detected. The correlations are probably the result of slight linkage between the three quantitatively inherited characters, oil content, yield and maturity. The simple correlation coefficients are sufficient measures of the relationships in question. A correlation of $r = +0.68$ was found between the F_1 and F_2 oil contents; F_2 and F_3 oil contents showed a correlation of $+0.71$. Predicted values of yield and oil content of single crosses, computed by means of regression equations, are sufficiently accurate for use in selection.

Burdick, A. B. *Self fertilization-effect of dominance on population*
 means and variances. (p. 65).

Three limited models have been devised in which the means and variances of quantitative characteristics in self-fertilized plants are considered. In one model the case in which no

dominance is evident is examined; the other two provide analyses of the effects of dominance. The uses of these models in plant breeding are indicated.

Epps, J. M. and Sherbakoff, C. D. A new anthracnose and mildew resistant red clover variety. (p. 66).

A new red clover, adapted to Tennessee and resistant to anthracnose and mildew, has been developed; its purple seeds will aid identification. In trials the variety has usually shown good stands in the second year when other varieties have poor stands under the same conditions. No varietal name is given.

Hull, F. H. Genetics of vigor. (pp. 66-67).

The author discusses his theory of overdominance and its application in cumulative selection for "nicking" in hybrid maize production (cf. *Plant Breeding Abstracts*, Vol. XV, Abs. 996).

Chase, S. B. Progress with forest tree crops. (p. 97).

Work of the Tennessee Valley Authority on crop bearing forest trees is reviewed. The black walnut Thomas was distributed to farmers. Seed selection for the production of material for grafting stocks of black walnut is in progress. Several selections of honey locust bearing pods with a sugar content exceeding 30% have been found. Pasture plantings of improved thornless varieties of honey locust have been established. Methods of establishing forest stands of the timber type of hybrid chestnut are being investigated; improved Chinese chestnut varieties are being propagated for regional testing as sources of nuts. Promising varieties of nut species and persimmon are under trial.

Ostrom, C. E. Southern pine tree improvement through breeding and tree selection. (p. 98).

Different geographical strains are known to exist in the loblolly (*Pinus Taeda*) and shortleaf (*P. echinata*) pines. The occurrence of geographical strains of longleaf (*P. palustris*) and slash (*P. caribaea*) pines is less certain; further information is required. Tree form and resistance to some diseases are heritable. The relatively few crosses so far made among the nine species of southern pines have not exhibited hybrid vigour. A cooperative programme of improvement is advocated, comprising extensive tests of geographical strains, selection and testing of superior trees, breeding of hybrids, and research on genetics and vegetative propagation. An advisory committee on research in southern pine genetics has already been set up.

Mortensen, J. A. and Brittingham, W. H. The inheritance of pod color in the Southern pea, Vigna sinensis. (p. 109).

Pod colour in the cowpea is largely determined by a factor for basic colour, designated *R*, and a multiple allelomorphous series. In some cases linkage exists between seed coat colour and pod colour. The factors for pod colour include the following, in order of decreasing dominance: *P*, purple pod; *P*¹, purple pod, and, in the presence of *rr*, drab pod colour; *B*, black seed coat and red-tipped straw coloured pod, and, in the presence of *rr*, straw coloration of the entire pod; and *p*, *p*¹ or *b* for straw coloured pod in the presence of *R* or *rr*.

Toole, V. K., Wester, R. E. and Toole, E. H. Relative germination response of some Lima bean varieties to low temperatures in sterilized and unsterilized soil. (pp. 109-10).

Varietal differences in resistance to low temperatures and *Rhizoctonia* have been found in laboratory tests, which are expected to be valuable in breeding.

Brittingham, W. H. and Mortensen, J. A. Varietal differences in shellout percentages in the Southern pea, Vigna sinensis. (p. 111).

The ranking of varieties for fresh yield differed according to the criterion used, viz. gross pod weight, peas shelled by hand or peas shelled by machine.

- Vanasse, N. A., *Specific gravity-dry matter relationship in potatoes.*
 Jones, I. D. and (*p.* 118).
 Lucas, H. L.

No marked effect of locality, variety or tuber size on the relationship between dry matter content and specific gravity was found in an analysis of potato samples grown in North Carolina.

- McLean, F. T. *Sources of breeding material for improvement of*
 cantaloupes. (*p.* 119).

In the search for disease resistant types of *Cucumis Melo* at the Virginia Truck Experiment Station, resistance to downy mildew has been found in some types from the West Indies and Texas; types from the monsoon area of southern and central India have shown resistance to both downy and powdery mildew. Most of this material produces fruits of poor commercial quality. Melons from Asia Minor, Afghanistan and Persia are very susceptible to both mildews, although some bear fruits with good flavour and appearance.

- Cordner, H. B., *Reaction of sweet potato varieties and seedlings to*
 Struble, F. B. and *root-knot nematode.* (*p.* 119).
 Morrison, L. S.

A study of 40 seedling lines and 4 varieties has indicated that nematode resistance is a recessive character with a relatively simple mode of inheritance. The parent varieties Orlis and Oklahoma 29 transmitted resistance to their progeny.

- Loden, H. D. *Speciation within Gossypium and the hybridiza-*
 tion of Gossypium hirsutum with other members
 of the genus. (*pp.* 158-59).

The importance of information on the modes of speciation and on the comparative cytology of *Gossypium* species in breeding is stressed.

- Stephens, S. G. *Cytogenetic methods of measuring interspecific*
 relationships in Gossypium. (*p.* 159).

Problems likely to arise in improving upland cotton by interspecific hybridization are discussed. Methods of measuring differences between the chromosomes of upland cotton and those of related species should be developed; by the aid of genetic markers, the transmission of chromosomes from the hybrids to their progenies may be investigated.

- Kerr, T. *Transference of lint length and strength into upland*
 cotton. (*pp.* 159-60).

It is pointed out that while the character of long staple has been successfully transferred from *G. barbadense* to upland cotton, superior spinning properties have not been successfully transferred to upland varieties. The transference of fibre strength from Hopi and the amphidiploid *G. arboreum* x *G. Thurberi* to upland cotton is discussed.

- Richmond, T. R. *Breeding methodology with interspecific derivatives.*
 (*p.* 160).

The results so far obtained with recurrent back-crossing of interspecific derivatives to upland stocks suggest that only small increments in important individual fibre properties can be expected in the immediate future. Unusual associations of several of these small increments have been secured. Establishment of the full expression of desirable characters of wild species in commercial cottons is a long range problem; in addition to recurrent back-crossing, bulk intercrossing and intercrossing between certain types selected from F_2 and F_3 hybrids are recommended. Study of a larger number of amphidiploids representing the range of types within each component species, and intensified production of amphidiploids of upland cotton with American wild species are also recommended.

- Meyer, J. R. *Plant and fiber properties of Gossypium species*
 for possible transfer to upland cotton. (*pp.* 160-61).

A short list is given of the distribution of valuable lint and other properties in Asiatic, African and diploid wild American species, which are of interest in the improvement of upland cotton by interspecific hybridization.

Stafford, T. J. and *The inheritance of strength in upland cotton.*
Henderson, M. T. (*p.* 161).

Inheritance of fibre strength was studied in a cross between Wilds and Half and Half. Strength was found to be quantitatively inherited. Both the F_1 and F_2 gave evidence of partial dominance for a low degree of strength. The data suggested that the parents differed by approximately four pairs of major genes for strength. Heritability of strength was 65%, compared with 7% heritability for lint yield per plant.

Loden, H. D. and *The effect of temperature upon the germination and*
Wilson, C. C. *subsequent growth of a number of varieties of*
 Gossypium hirsutum (L). (*p.* 162).

Marked varietal differences in germination and subsequent seedling growth were observed in tests carried out at 17° C. Further experiments are to be undertaken to discover whether genetic segregation within the *G. hirsutum* genome with respect to physiological characters can be detected by means of such tests.

Brinkerhoff, L. A. *Occurrence of bacterial blight resistant plants in 20*
and Green, J. M. *varieties of cotton.* (*pp.* 162-63).

Resistant plants were found in 10 of the 20 varieties artificially inoculated with *Xanthomonas malvacearum* at the Oklahoma Agricultural Experiment Station. Varieties originating in Oklahoma and western Texas yielded the highest numbers of resistant plants.

Hertel, K. L. and *Cotton immaturity as measured by the arealometer.*
Craven, C. J. (*p.* 163).

An air flow method of determining fibre fineness and immaturity of single plant samples is described.

2457.

**Annual Report of the Director of the New Hampshire Agricultural
Experiment Station 1949.**
Sta. Bull. 1949 : No. 382 : Pp. 47.

Cereals

Disease resistant varieties of oats developed in the USA were tested. Extensive trials were carried out on maize hybrids.

Red clover

A promising strain with a perennial tendency has been bred.

Potato

Pawnee (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1049), Essex (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2308) and Ontario (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2658) have shown considerable promise. Kennebec, Mohawk, Ontario, Madison, B 76-43 and Ashworth gave good results in tests of suitability for crisp manufacture.

Apple

Crosses have been made between Winter Banana and the tetraploid sport Giant McIntosh, with a view to obtaining triploids combining the valuable characteristics of both parents.

Rubus

From crosses between the cultivated raspberry and *R. Chamaemorus* productive hardy canes have been secured, ranging from 1 to 6 feet in height at maturity.

Blueberry

Breeding aims at increased hardiness. Crosses have been made between a local large fruited, high bush blueberry with improved commercial varieties from New Jersey and Maryland, and between the high bush variety Pemberton and wild low bush types.

Cucurbits

Early musk melons and early, cold resistant cucumbers introduced from Korea will

probably form useful breeding material. The watermelon Colebrook (Shingyamato) shows promise (cf. Abst. 1388).

Egg plant

A highly productive introduction from Korea has been named Korean Long. Single plants have yielded 10 to 12 mature fruits before the occurrence of frosts.

Lima bean

White Mountain Bush is the earliest variety so far obtained in New Hampshire (cf. Abst. 1388).

Soya bean

An oriental table variety, which has been named Pando, has yielded green shell beans in 78 days from sowing; the plants are compact and about 1 foot tall.

2458.

Progress through your College of Agriculture.

Rep. Vt. Agric. Exp. Sta. 1950 : No. 4 : Pp. 32.

Forage legumes

The responses of ten strains of *Trifolium pratense* to local conditions are being compared with those of several strains of *T. repens*. Plants showing desirable growth characteristics are to be used for breeding improved varieties.

Apple

Methods of dusting and spraying pollen for cross pollination of the variety McIntosh are being tested so that fruit set may be induced, irrespective of bees, during bad weather.

Blueberry

The hardiness of blueberries is being investigated.

Strawberry

Some 36 promising seedlings bred at the Station (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1486) are undergoing further trials.

Maple

At the Proctor Maple Research Farm seedlings from desirable open-pollinated parents are being selected for rapid early growth.

Vegetables

Horticultural studies have included the improvement of many vegetable varieties.

2459.

Report of the Storrs Agricultural Experiment Station for the year ending June 30, 1950.

Bull. Conn. Agric. Exp. Sta. 1950 : No. 271 : Pp. 50.

Forage legumes

Lucerne yield trials are being continued. A strain of French origin has shown an outstanding power of recovery after mowing, but its resistance to wilt has not yet been confirmed. The wilt resistant variety Buffalo continues to do well and is recommended for areas where reseedling is delayed for more than three years.

Potato

An analysis of mealiness and specific gravity of six varieties has been carried out to determine possible relationships between these characteristics.

The varieties Kennebec, Teton and Ontario have outyielded the standards, Green Mountain and Katahdin, at two locations.

Blueberry

Eight varieties have been analysed for ascorbic acid and thiamin content. The effects of storage and various freezing techniques on fruit flavour have been recorded.

Kale

Dwarf Blue Scotch Curled and Siberian were preferred to Dwarf Scotch Curled or Tall Green Scotch Curled in palatability tests after cooking by various methods. The average ascorbic content of the three Scotch Curled varieties was higher than that of Siberian; the thiamin content in all four varieties was similar.

2460.

**Sixty-Third Annual Report of the College of Agriculture at
Cornell University and of the Cornell University Agricultural
Experiment Station 1950 : Pp. 192.**

Bacteria

Determination of the genetic constitution of individual cells of *Escherichia coli* derived from strains heterozygous for some 12 genes is in progress. The segregation of haploids, with various genetic combinations, from heterozygous diploid strains, appears to indicate a process comparable with meiosis in other organisms. Evidence has been obtained of lethal effects due to a deficiency in one of the chromosomes. All observations are compatible with the two-strand hypothesis of crossing-over.

Fungi

By using mutant strains of *Neurospora*, α -amino- δ -hydroxy valeric acid has been identified as an intermediate in arginine and proline synthesis and a probable precursor of ornithine and proline. A mutation at a single gene locus is responsible for the requirement of arginine and adenine by one particular strain. The forms of *Neurospora* which have become adapted to canavanine inhibition show mutation at the gene locus which determines canavanine resistance in certain wild types. The effects of salts of nucleic acid on canavanine resistant mutants are being investigated.

Wheat

Selection 828a 1-2-3, a promising winter type superior to Cornell 595 and Yorkwin in several respects, is being tested for flour quality.

Oats

Promising hybrids with resistance to crown rust and *Helminthosporium* blight have been obtained from crosses between Landhafer, Santa Fe, Ukraine, Trispermia and a selection from Ithacan x Victoria. They are to be tested for yield, straw strength and kernel quality.

A histological investigation of the reaction of resistant and susceptible varieties to *Helminthosporium Victoriae* has been completed. Varieties resistant to the blight are generally termed immune although there is evidence of a definite intracellular resistance rather than immunity.

Maize

Greater regularity of chromosome behaviour, measured by an increased frequency of bivalents, was observed in a synthetic variety of tetraploid maize in 1948 than in 1938 (cf. Abst. 2628).

Trials involving early, medium and late maturing hybrids have been conducted at 16 locations. Those problems receiving special attention were hybrid vigour and inheritance of smut and aphid resistance.

The release of hybrids 384 x 399 and 506 x 507 for seed production is reported. Both have consistently outyielded standard Wisconsin varieties as silage or grain crops. Hybrid 384 x 399 has a high degree of smut resistance, and both are resistant to lodging.

Barley

A new spring barley, named Erie, has been developed; it will be released for growers in New York as soon as seed is available. The variety is a two-rowed, smooth awned type with resistance to powdery mildew. In yield trials it has produced three bushels per acre more than Alpha, the standard two-rowed form.

Moore (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1801) has been recommended as a spring barley suited to conditions in New York.

Several new selections of winter barley with stiff straw have outyielded Wong by 10 to 15 bushels per acre.

Forage grasses

Four strains of southern brome grass, Achenbach, Elsberry, Fischer and Lincoln, have outyielded northern types under varied cultural conditions and have a higher degree of resistance to brown leaf spot. Fischer has a slightly higher yielding capacity than the rest.

Varieties of timothy differing in time of maturity are recommended for poorly drained soils at high elevations.

Forage legumes

The results of lucerne yield trials are reported. Narragansett has shown promise during the past two years (cf. Abst. 1908).

Several red clover varieties including Cumberland and Kenland (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 993) have shown adaptability to conditions in New York.

Potato

Several selections with characteristics superior to standard varieties are undergoing final tests; further seedling selections are being made. Differences were observed in the reaction of seedlings towards insect pests; many apparently resistant lines produced acceptable tubers.

Breeding for resistance to leaf roll is of increasing importance. Seedling 2V2452, which possesses field resistance to this disease, has been named Canoga (cf. Abst. 2775). Its tubers are of good quality and it compares well with Kennebec and Essex in respect of yielding ability.

The progeny of crosses between *Solanum sucrense*, a wild type with resistance to golden nematode, and several commercial varieties have been tested for reaction to the pest; an average of 3% appeared to be resistant. Although a positive correlation was found between the degree of larval emigration from protecting cysts, due to the stimulus of a diffusing substance from the roots, and the number of immature nematodes on the roots, it was not considered high enough to be useful in the present breeding work.

Marked varietal differences in the occurrence of surface black spot and severity of blackening were observed in five localities; Ashworth and Pontiac had the lowest percentage of black spotted tubers. All varieties ultimately developed symptoms during storage.

Tobacco

The expression of a "mammoth" character caused by transferring a gene from *Nicotiana Tabacum* to *N. rustica* (cf. Abst. 1228) depends on the influence of the photoperiod, a single gene locus and the residual genotype of each species.

It has been demonstrated that certain degrees of vigour exhibited in F_1 intervarietal hybrids of *N. rustica* can be fixed in inbred lines by selection. The success of selection for plant height or leaf length was proportional to the calculated heritability. Selection for an increased number of leaf nodes exceeded the estimated heritability; this was probably due to the recessive nature of the genes determining this character.

Corolla measurements taken from early bud stage to maturity have shown that recombination of characters is restricted in the progeny of *N. Langsdorffii* x *N. Sanderae*.

Genetically controlled tumours have been found in 16 interspecific hybrids, five of which involved *N. Langsdorffii* (cf. Abst. 2043). While studying new species combinations the chromosome number $2n = 144$ was recorded; this is the highest number yet found in the genus. Abnormalities resembling somatic mutations were reported in the progeny of *N. Bigelovii* x *N. glauca* and *N. glutinosa* and *N. glauca*. Compatible crosses between polyploids were observed although their immediate diploid parents were incompatible; this observation provides further evidence of the possible methods of convergence in evolution.

Onion

Many experimental hybrids produced from inbreds by H. A. Jones in California have shown promise in local adaptability tests. Those best suited to the Elba and Orange areas are derived from a small group of Early Yellow Globe inbreds. Male sterility is being incorporated in the new varieties.

Celery

A *Cercospora* resistant variety, 45-219, has been developed in cooperation with the Florida Agricultural Experiment Station from Danish x Golden Self Blanching, back-crossed to the *Fusarium* root rot resistant varieties Cornell 19 and 6. The new celery is of good eating quality and moderately resistant to *Septoria* blight. It is undergoing further trials before seed increase.

Beans

Several strains resembling Michelite, but with a high degree of resistance to strain 15 of bean mosaic, have been obtained from a cross between the susceptible Michelite and the resistant Great Northern 1, followed by back-crossing to Michelite. They are not to be released unless the disease becomes serious. Another strain of the same parentage matures 5 to 7 days earlier than Michelite with slightly larger seed.

Halo blight resistant strains resembling Red and White Kidney beans and Tendergreen snap bean are being sought in the progeny of crosses between these varieties and the resistant Great Northern 1.

Greater uniformity in size, shape and colour of seed and higher yields are the criteria for selections being made from Yelloweye. Strain 7-16 selected from the variety Perry Marrow has consistently outyielded standard varieties grown locally. As its seeds are very wrinkled, strain 7-16 has been crossed with Perry Marrow and Red Kidney in an attempt to incorporate its high yielding ability in commercially acceptable varieties. Valuable breeding material having resistance to *Fusarium* root rot has been obtained from the collection of the late R. A. Emerson.

2461.

Sixty-Ninth Annual Report of the New York State Agricultural Experiment Station, Geneva, New York 1950 : Pp. 51.

Pome fruits

Differences in response to Parathion, used as a spray for codling moth control, were observed in several apple varieties.

Apple varieties have shown differences in juice colour, flavour, acid content, total solids, and reaction to the ascorbic acid method of processing fruit juice.

A total of 148 tetraploids ($2n = 68$) have been found among seedlings of commercially grown triploid apple varieties. Several large-fruited sports of Northern Spy, Rome, Wealthy, Yellow Transparent, McIntosh and Jonathan proved to be periclinal chimeras with diploid layers covering internal tetraploid tissue; these produce triploid progeny when crossed with diploid varieties.

Progress has been made towards breeding apple varieties of superior late-keeping quality, both for processing and table use.

Breeding for blight resistant pears is continuing, using parents with a higher than average resistance. It is hoped that varieties ripening throughout several weeks may be obtained.

Stone fruits

One apricot seedling, from crosses made to obtain late flowering varieties able to escape frost injury, has bloomed a week later than normal.

Productive plum varieties of high quality, ripening throughout the season, are being sought in the breeding programme. Selections from a few crosses appear to be promising. Sweet cherry crosses have been effected in order to develop firm fruits resistant to cracking and to prolong the picking period over several weeks.

Crosses between peaches of good quality and those with winter hardiness have been made in attempts to combine these characters.

Small fruits

Promising raspberry seedlings have been obtained from a cross between Bristol, a black raspberry, and Station 17861 (Newburgh x Indian Summer), a red variety.

Varieties and selections of strawberry and raspberry grown at the station have been tested for their adaptability to freezing, and analysed for vitamin C content.

Crosses between commercial strawberries have been made to obtain superior varieties for processing and transporting.

Cabbage

Attempts to breed short cored strains suitable for kraut manufacture have been successful. Further improvement in respect of other characters is being sought. Internal necrosis in cabbage heads is found in varying degrees in progenies of different crosses between standard kraut varieties; the possibility of genetical control is being investigated.

Gourds

The resistance of varieties of *Cucurbita moschata*, *C. maxima* and *C. Pepo* to the squash vine borer (*Melitta cucurbitae*) is discussed with respect to the degree of stem toughness.

Tomato

Several promising selections have been obtained, adapted for canning either whole or as purée. Progress is being made in the development of early varieties suitable for packing while still green or for canning.

2462.

Report of the Maryland Agricultural Society, the Maryland Farm Bureau, Inc. for the year 1949 (1950) : 34 : Pp. 276.

Sweet potato

Results of an investigation concerning uptake of potassium have shown that Porto Rico assimilates more than Maryland Golden to produce a crop of equal size.

It is hoped that a breeding programme will be started in 1950 to improve yielding capacity, quality, uniformity in colour, size and texture, resistance to cracking, and general adaptability to local conditions.

Tobacco

The need for varieties with an increased percentage of high quality leaf and resistance to black shank (*Phytophthora parasitica* var. *Nicotianae*), *Fusarium* wilt, bacterial wilt and mosaic disease is emphasized.

Apple

Varieties grown commercially are discussed with reference to the 1949 orchard survey. The absorption of nitrogen in the form of urea, applied as a foliage spray, depends on the hairiness of the leaf epidermis. A three-spray treatment appears to be more effective on varieties with medium and heavy pubescence, such as McIntosh, Stayman or Jonathan, than on Rome, Delicious or Golden Delicious, which are only slightly pubescent.

Cantaloupe

A study of the marketing quality of cantaloupes grown in Maryland and other states has shown a positive correlation between sugar content and the preference of the consumer. The relative sugar content of varieties fluctuates in different localities and throughout the growing season.

Vegetables

The characteristics of varieties of water melon, cucumber, tomato, snap bean and Lima bean recommended to Maryland growers are listed.

2463.

Sixty-second Annual Report of the Georgia Experiment Station of the University of Georgia, Experiment, Georgia, July 1, 1949-June 30, 1950 : Pp. 92.

Wheat

The best varieties have been crossed with wheats resistant to mildew and Hessian fly; several promising lines are under test.

Oats

Red Rustproof, Arlington and commercial varieties have been crossed with Trispermia, Santa Fe and Landhafer. Crown rust resistant lines have been selected from these

crosses and will be studied for resistance to *Helminthosporium Victoriae*. A large number of varieties and hybrids are being tested for winter forage production.

Maize

Georgia 101, a white hybrid released in 1948, has given the highest yields during the last two years (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2170); its performance has also been outstanding in other states besides Georgia.

Barley

The results of extensive tests indicate that Calhoun, Sunrise and Colonial are the highest yielding varieties.

Cotton

Breeding is concentrated upon improving the fibre qualities and wilt resistance of Empire. This variety has therefore been used as a recurrent back-cross parent in crosses with several types possessing exceptionally strong fibre. Plants with a tensile strength above 100,000 lb. have been found in some hybrid lines; further back-crossing is required to improve their agronomic characters. Lines developed by back-crossing hybrids between Empire and Stoneville 20 to Empire have shown immunity from angular leaf spot and fairly satisfactory agronomic characters; further back-crossing to obtain suitable fibre strength may be necessary.

Sweet potato

A variety with better quality for processing than Porto Rico is being sought.

Groundnut

A wild species from Brazil, probably *Arachis Diogeni*, is apparently immune from *Cercospora* leaf spot; attempts to cross it with Spanish failed. Several new hybrid selections and strains of commercial varieties show promise and have been entered in the Southeastern Regional Tests. Three new strains have been developed and released: Spanish 146, North Carolina Runner 56-15 and Virginia Bunch 67.

Cantaloupe

The new strain, S 47, resistant to downy and powdery mildew and plant lice is being increased for extensive testing. Its pedigree involves a wild inedible introduction resistant to mildew, Hearts of Gold possessing good quality, and Smith's Perfect which carries genes for resistance to plant lice. Two introductions resistant to *Macrosporium* leaf blight have been crossed with S 47, in the hope of developing a strain resistant to plant lice and the three fungus diseases.

Water melon

Valuable selections have been obtained from crosses between the *Fusarium* wilt resistant variety Georgia 2 and Ice Box, which equal the former in quality and have a very thin but tough rind. Congo, resistant to anthracnose, and Georgia Wilt Resistant have been crossed to combine resistance to both diseases.

Soya bean

The following varieties possess some degree of resistance to bacterial pustule: L 4-6290, Ogden, Hale, Dortchsoy, N 540-1, N 45-2885, N 45-3728, N 45-2994, Oklahoma 710, FC 31592, Cherokee and Seminole.

Pea

Some hybrid selections have shown a high degree of disease resistance and produced higher yields of green manure than Austrian Winter.

Breeding has been initiated to develop an improved variety, particularly for processing.

2464.

Science serving agriculture. Part I.

Bienn. Rep. Okla. Agric. Exp. Sta. 1948-50 (1950) : Pp. 61.

Wheat

Promising hard red winter wheats have been bred. The use of *Agropyron elongatum* as a source of rust resistance is being explored.

Oats

A winter oat, not yet named, shows promise as a substitute for Wintok.

Maize

Hybrid production is in progress. The most valuable hybrids now available have out-yielded the best open-pollinated varieties by 35 to 40% in extensive trials during several years. Wide differences in suitability for mechanical harvesting have been noted among hybrids.

Barley

The winter barley Harbine has been released (cf. Abst. 337). Inheritance of resistance to green bug is under analysis.

Sorghum

Breeding is concentrated upon the production of disease and pest resistant grain sorghums suitable for combine harvesting. A hybrid between tall red kafir and a strain having tan plant coloration shows promise of being a forage sorghum possessing disease resistance, nonbitter seed and good yielding ability. Breeding is also being carried out on syrup sorghums. Two recently released dwarf kafirs, 44-14 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 960) and Redlan, give higher yields than the usual kafir strains. A dwarf darso is ready for trial and increase. Dwarf sorghums are also being developed as parents for F₁ hybrid seed. Resistance to charcoal rot is being incorporated in commercially acceptable strains.

Forage crops

An improved strain of smooth brome grass, adapted to central and northeastern Oklahoma, has been released for seed increase; further selection and increase of other strains are under way. Selections of little bluestem (*Andropogon scoparius*), switchgrass (*Panicum virgatum*) and buffalo grass (*Buchloe dactyloides*) are being tested. A late maturing selection of sweet sudan, leafier and more resistant to diseases than other types, is being increased for further trial.

Wilt resistant strains of the lucerne Oklahoma Common are being used in polycrossing.

Sweet potato

The variety Allgold has been released (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2416).

Cotton

Mebane 6801 is undergoing increase for commercial distribution in western Oklahoma. Seed of Stoneville 62 is already available to growers in central and eastern Oklahoma. Stormking, a strain of Mebane 6801, is being subjected to final selection; in addition to storm resistance and good lint characters, it has the advantage of being especially suitable for mechanical harvesting.

Bacterial blight resistant plants have been found among several commercial varieties; these will be used in breeding.

Castor bean

The Oklahoma Station is now the centre of breeding and agronomic research in the Great Plains region.

Pecan

Varietal trials are in progress at the new Pecan Research Station, Lincoln county. Selected native pecans show superior quality.

Rubus

Hybrids and native types are included in the breeding material being established at the Bixby Station. Breeding is to be concentrated upon raspberries.

Grapes

Breeding is being carried out to obtain a satisfactory table variety.

Water melon

Improvement of Oklahoma Black Diamond with regard to uniformity and wilt resistance is in progress.

Tomato

Breeding objectives include nematode resistance.

Lima bean

New strains developed in Oklahoma have given good results in national trials. Nematode resistance is receiving attention.

Cowpea

Edible and field types are under test. Disease resistance is being sought among a large number of hybrids.

2465.

Applying science to farm problems. Fifty-Ninth Report of the Arkansas Agricultural Experiment Station, July 1, 1948–June 30, 1950 : Bull. 505 : Pp. 31.

Maize

Early maturing hybrids are being developed to determine the possibility of obtaining a good crop before the summer drought. Breeding work includes efforts to develop high yielding hybrids suited to various regions in Arkansas.

Sorghum

Trials of imported grain varieties are in progress; those types best suited to local conditions will be used for breeding improved strains.

Forage legumes

It is hoped that lucernes with resistance to bacterial and *Fusarium* wilt, leaf spot and crown rot will be developed. Varieties from Argentina, Africa and Australia are being compared with those grown commercially in the USA.

Satisfactory performances of Doark vetch (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1859) and Climax lespedeza (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1350) are reported.

Sweet potato

A comparison of the vitamin A content of different varieties, after cooking, has shown that Golden Belle and Oklahoma 24 have the highest content, particularly when cooked in their skins.

Cotton

Reports concerning Arkot 2-1 (cf. Abst. 1184) have been favourable. Two more outstanding lines have been developed; one combines resistance to bacterial blight with high yielding capacity and the other produces high yields of good quality fibre. Varieties resistant to *Verticillium* wilt are being imported from Africa to be introduced into the breeding programme.

Regional tests of existing varieties are being conducted to facilitate the choice of types suitable for each area.

Oil plants

The possibilities of developing strains of castor bean and sesame adapted to combine harvesting are being investigated.

Fruits

New substations have been established at Lamar and Nashville for research on peaches, and near Bald Knob for strawberry research. Varieties of peach and blackberry suited to quick freezing are being developed.

Broccoli

Several varieties of broccoli grown at the Van Buren and Fayetteville stations have proved to be of high quality after quick freezing.

Tomato

Since bright red types have a high marketing value, attempts are being made to breed a disease resistant tomato with a high lycopene content.

Soya bean

Breeding work has begun for improved resistance to diseases and insects, and for high yields of beans containing large amounts of good quality oil and protein.

2466.

Sixty-First Annual Report of the University of Tennessee Agricultural Experiment Station 1948 : Pp. 170.

Wheat

Progress in breeding for rust resistance is reported.

Oats

Straw stiffness and winter hardiness are the chief aims of breeding. Tenn. 14 (Tennex x Bond) is being increased; it has the hardiness of Tennex and the straw stiffness of Bond, and has outyielded Fulgrain.

Maize

Tennessee 602, a yellow hybrid producing a large proportion of two-eared plants and fairly resistant to lodging, has been released (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1772).

Barley

New strains combining stiff straw and winter hardiness gave a good performance. Varieties resistant to *Ustilago nuda*, obtained from Missouri, are being used in breeding for resistance to this disease. Strains from awnless barley x Jackson 1 are being used as mildew resistant parents.

Forage legumes

Some lespedeza strains obtained from the US Department of Agriculture show promise but probably commercial seed production of these strains will not be feasible in Tennessee as they tend to produce very little seed.

Factors affecting seed production of lucerne are under investigation. Selections are being tested in cooperation with the US Department of Agriculture.

Methods of treating crimson clover and lespedeza with colchicine are being tested; preliminary results suggest that in general a 0.1% solution is the most satisfactory.

Purple seeded red clover is being selected for improved vigour. Increased resistance to anthracnose and mildew is also being sought.

Cotton

Promising strains include Tenn. 241, derived from a cross between two inbred lines of Stoneville, 68-3 and 136-4-1. Early maturity is receiving particular attention in breeding. Wilt resistant selections have been secured but improvement in yielding capacity is required.

Tobacco

Promising mosaic resistant lines of dark fire cured tobacco have been developed at the Highland Rim Experiment Station. Black root rot resistant Burley 1, a line of Greenville 21 developed at the Tobacco Experiment Station, has been released (cf. Abst. 2906). Breeding lines with a high degree of resistance to wildfire and black root rot and equalling Kentucky 16 in yield and quality have been developed.

Pear

New pears, possessing some degree of fire blight resistance, are under trial.

Rubus

A good germination of hybrid black raspberry seed was secured, using shredded sphagnum. *Rubus* species from various countries have been introduced for raspberry breeding. Blackberry and dewberry breeding is in progress.

Strawberry

New crosses were effected to obtain improvements in transportability, quality for processing and red core resistance. Sport, 48-18 and W 5 x D 25 are considered to be worth further testing and breeding on account of their black root resistance.

Water melon

Breeding for *Fusarium* wilt resistance continued. Crosses were made between the resistant Miles (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2540) and varieties possessing tough rind.

Tomato

Hybrids are being studied at the West Tennessee Station to develop an early variety for green wrapping. A mutant with nondehiscent anthers has been obtained from the Pennsylvania Agricultural Experiment Station; this type of male sterility is being incorporated in commercially valuable varieties with a view to hybrid seed production. Crosses of the potato leaved, long styled variety Red Jacket with John Baer were made in the field without emasculation. One third of the seed from Red Jacket consisted of hybrids.

Breeding for *Fusarium* wilt resistance continued.

Egg plant

Breeding has been initiated.

Snap pbean

Urd bean hybrids are being used as parents.

Soya bean

Breeding is in progress.

2467.

**Sixty-Second Annual Report of the University of Tennessee
Agricultural Experiment Station 1949 : Pp. 177.**

Wheat

Breeding for rust resistance continued.

Oars

Tenn. 14 (cf. Abst. 2466) has been released under the name LeConte. In addition to stiff straw and winter hardiness, the new variety possesses resistance to lodging and some resistance to rust.

Maize

The yellow hybrid Dixie 22 (T 6013) and the white hybrid Dixie 33 (T 7112) were released.

Barley

Mildew resistant strains have been obtained from Marett Awnless x Jackson 1. Hybrid material from crosses of Tennessee strains with the smut resistant varieties Dorsett, Gatami, Kinroku and MEB 472, 404 and 502 is being studied for smut resistance. Wong is being used in breeding for stiff straw.

Forage grasses

Breeding and selection of Kentucky bluegrass, cocksfoot, tall meadow fescue, smooth brome, rescue grass and Harding grass is being carried out.

Forage legumes

Investigation of factors affecting seed production in lucerne continued.

Crown rot resistance in lucerne is receiving attention.

Breeding of purple seeded red clover for resistance to anthracnose and powdery mildew continued.

No conclusive results have yet been obtained from experiments on colchicine treatment of crimson clover and lespedeza.

Cotton

Crosses between inbred lines have yielded Tenn. 241 (cf. Abst. 2466) and other promising selections.

Fusarium wilt resistant material is being selected for high yield, long staple and strength. The resistance to bacterial leaf spot of Acala 20 is being incorporated in the best *Fusarium* wilt resistant lines. Giza 7, certain *Fusarium* wilt resistant lines and an African cotton may prove valuable sources of resistance to *Verticillium* wilt.

Tobacco

Lines of dark fire cured tobacco were tested for their resistance to black root rot, mosaic and wild fire at the Highland Rim Experiment Station. A few F_3 hybrids show a high degree of resistance to black shank.

In extensive tests during the period 1947 to 1949 Burley 1 (cf. Abst. 2466) has given an average increase of 5.5% in dollar returns per acre, compared with the most popular standard variety.

New lines developed at the Tobacco Research Station, combining resistance to wildfire, mosaic and black root rot, are to be tested in 1950. Breeding for black shank resistance is in progress.

Pear

Tests of fire blight resistant selections continued.

Rubus

The raspberry Tennessee Prolific was released (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1148).

In breeding blackberries and dewberries, the greatest numbers of seeds in proportion to the extent of pollination were collected from the following crosses: Alfred x Ozark Beauty, Alfred x Eldorado, Early King x Ozark Beauty, Eldorado x Ozark Beauty, Eldorado x Alfred, Eldorado x Early King and Thornless Boysen x Early King.

Seeds have been obtained from crosses of Eldorado, Alfred, Latham, Royal, Latham x *R. parviflorus* and Bedford Giant as female parents with *R. macrocarpus*. Seed of *R. glaucus* has been introduced. The chief aim of importing foreign species for hybridization is improved fruit size.

Strawberry

In breeding for black root rot resistance new crosses were made. Sel. 99-11 [Geneva 92455 x Plant Path. 1937 (B 16 x B 53) x SW 5] exhibited a high degree of resistance and is to be used for crosses in 1950.

Asparagus

The average annual yields of 34 selections have ranged from 960 to 3060 lb. per acre.

Tomato

F_1 hybrids involving Rutgers, Pritchard, Stokesdale, Pennheart and Indiana Baltimore have given good results.

Early and recent breeding work on resistance to *Fusarium* wilt is surveyed. New wilt resistant varieties have been developed which outyield the best resistant and susceptible varieties now available to growers.

Snap bean

Crosses of a green strain of *Phaseolus Mungo* from India with garden beans and urd hybrids are being attempted.

Soya bean

Breeding and testing continued in cooperation with US Department of Agriculture.

2468.

Progress of Agricultural Research in Indiana. Sixty-Third Annual Report of the Director, Purdue University Agricultural Experiment Station, Lafayette, Indiana, for the year ending June 30, 1950 : Pp. 150.

Wheat

New soft red winter wheats possessing a high degree of leaf rust resistance, extreme earliness and high yielding capacity are to be more extensively tested for yield and quality. Immunity from Hessian fly has been transferred from a macaroni wheat to promising leaf rust resistant varieties of soft red winter wheat. Soft red winter wheat lines showing superiority in rust resistance and milling and baking quality are being subjected to artificial freezing tests in the F_4 , F_5 and F_6 generations.

Maize

Breeding for resistance to northern leaf blight is in progress; sources of resistance include the inbreds L 97, Mo. 21A and NC 34.

Three new yellow hybrids and one white hybrid were approved for commercial seed production. The yellow hybrids, Ind. 680A [(Wf 9 x 38-11) x (Hy x L 304A)], Ind. 686A [(Wf9 x Hy) x (07 x L 304A)] and Ind. 803A [(Hy x L 304A) x (P 8 x 07)], show improvements in yield and other characters in comparison with US 13. They all mature 2 days earlier than US 13. The white hybrid Ind. 501A [(4Co82 x H 25) x (33-16 x H 21)] matures a week earlier than US 13 and stands better; in yield it has equalled US 13 and Ind. 605A.

Pollen and ovule semisterility found in miniature seed stock are due to two different genes. Semisterility of the pollen is controlled by a single recessive factor transmitted by both parents; semisterility of the ear is caused by a lethal factor transmitted only through the pollen. The chief cytological aberration produced by the gene for pollen semisterility is the tendency of one or more bivalents to separate precociously.

Potato

Unnamed seedlings are being tested for yield on the muck soils of northern Indiana; they possess improved quality as shown by their white flesh colour and higher specific gravity; the USDA seedling B 61-3 is of particular interest.

Apple

Whether or not seedling reaction to disease corresponds with disease reaction after one or two years in the orchard apparently depends upon the parent species used as the source of resistance.

Tomato

In tests of F_1 hybrids, Pritchard x Rutgers, Burpee Hybrid and Tomato No. 7 proved to be the best for canning and the domestic garden; Earliana x Valiant and the hybrid Faribo showed promise for the early market. Hand pollination of male sterile flowers is considered to be the most economical method of hybrid seed production. Back-crossing to incorporate male sterility in varieties which have been found to be valuable parents for F_1 hybrids is in progress.

Selections resistant to *Septoria* leaf spot have been secured. Resistance was derived from *Lycopersicon hirsutum*; this resistance is relative, in that the leaf lesions are restricted in size. Further crossing has been undertaken to combine resistance to *Septoria* and immunity from *Fusarium* wilt. Promising selections immune from *Fusarium* have been developed; a wilt immune strain of Red Currant formed the source of resistance. One of these selections, obtained by crossing Indiana Baltimore x Red Currant with Rutgers and repeated back-crossing to Rutgers, has equalled the latter variety in yield and quality and is being increased; it is resistant to both known races of wilt. The selection is being further back-crossed to a possibly better strain of Rutgers.

Selections bearing fruits approaching commercial size contained about twice the amount of vitamin C of standard varieties in tests made during 1949. Lines with 10 to 12 times the provitamin A content of commercial varieties and with good yielding ability and fruit size have been developed; additional back crosses may be necessary to improve their taste and quality.

Soya bean

The new early variety Blackhawk is being multiplied (cf. Abst. 2258). Breeding is in progress.

Peas

Breeding is in progress.

Sweet corn

Hoosier Gold is to be released; it matures one week earlier than Golden Cross Bantam and has good canning and freezing quality.

Popcorn

Cross sterility is conditioned by an allelic series at a single locus. Plants homozygous for

a sterility factor cannot be pollinated by dent maize. Transference of cross sterility to inbreds of Supergold would therefore eliminate contamination.

2469.

What's new in farm sciences.

Bull. Wis. Agric. Exp. Sta. 1949 : No. 489 : Pp. 102.

Oats

The results of varietal tests are reported. The varieties Vicland and Forvic, susceptible to *Helminthosporium* blight, are being replaced by resistant derivatives of Bond where blight is seriously affecting yields.

Barley

Further information is given concerning the variety Moore (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1801) which has grown well in Wisconsin, showing high lodging resistance, good yields and ease of combine harvesting.

Forage grasses

The inheritance of the tendency to form hydrocyanic acid is being determined in strains of Sudan grass, so that forms with low acid content may be obtained. It is hoped to combine this desirable characteristic with resistance to anthracnose and leaf blight.

Variations in vigour, winter hardiness, disease reaction and seed yields have been found in different types of smooth brome grass, orchard grass, meadow and red fescue and timothy grass undergoing tests for adaptability to numerous localities.

Forage legumes

The reason for the occurrence of a high percentage of lucerne plants having shrunk pollen is being investigated. These plants tend to be self sterile and, when crossed, produce weak progeny.

Several lines of lucerne with a high degree of resistance to bacterial wilt have been recovered from crosses between immune and susceptible plants. This resistance is being incorporated in lines which are already resistant to common leaf spot. The nature of virus diseases attacking lucerne is being determined so that resistance may be obtained by breeding.

In order to reduce the coumarin content of strains of sweet clover, these are being crossed with a Canadian strain which is almost coumarin free.

Interspecific crosses between *Melilotus alba* and *M. dentata* (coumarin-free) have produced hybrids of low coumarin content which are being crossed with sweet clover strains of good forage quality.

Potato

A programme of selection within Chippewa has resulted from the discovery of variation in the yields of strains grown at Starks, Wis., amounting to a difference of 110 bushels per acre.

The possibility of improving potatoes by introducing stocks from Brazil and Mexico is being investigated.

A correlation between size of leaf stomata and chromosome number, which has been noted at Madison, will be used by breeders to determine chromosome numbers more readily when selecting plants for crossing.

Tobacco

In conjunction with the US Department of Agriculture, crosses between Havana and mosaic resistant parents have produced some progeny which closely resemble the Havana parent and on which the mosaic is restricted to very small spots. By inbreeding it is hoped to increase resistance. The search for plants resistant to cucumber mosaic continues; it is hoped to combine resistance to both forms of mosaic in a single variety.

Forest trees

The 25 hybrid poplars introduced from the Northeastern Forest Experiment Station have shown insufficient resistance to *Cytospora* or *Septoria* canker, although many resisted attacks of *Hypoxylon*. Additional hybrids are being produced from native poplars with the intention of developing greater resistance to these diseases.

Some Wisconsin forms of *Pinus Lambertiana*, selected for a high degree of resistance to *Cronartium ribicola*, have been propagated by grafting resistant scions on to young seedlings. The resistance is inherited in very few progeny.

Six red cedar selections have shown a high degree of resistance to cedar-apple rust in field tests.

To provide foundation stocks for the establishment of a conifer breeding collection in Wisconsin, seeds obtained from various parts of the USA and Canada are being grown at the Trout Lake and Griffith State nurseries.

Cabbage

A cabbage type of plant, resistant to those strains of *Plasmodiophora Brassicae* prevalent in Wisconsin, has been obtained by selection from crosses between resistant kale varieties and susceptible cabbages. The resistance does not apply to strains of *Plasmodiophora* from Britain and Nova Scotia; hopes of making introductions from these countries to supplement the available breeding material, in further attempts to combine resistance to *Fusarium conglutinans*, have been abandoned.

Cucumber

Lines resistant to mosaic and others resistant to scab are being developed; it is hoped that resistance to both diseases may be combined with other desirable characteristics.

Bean

Attempts are being made to develop beans with improved virus resistance following the discovery of new strains of both yellow and common mosaic in Wisconsin.

Soya bean

Several hybrid selections of Lincoln and Richland parentage have shown promising yielding capacity, oil content and lodging resistance. Results of varietal trials indicate that Flambeau is suited to northern Wisconsin, Monroe is best adapted to central areas and Hawkeye to the south.

2470.

63rd Annual Report of the Agricultural Experiment Station, the University of Nebraska College of Agriculture 1950 : Pp. 162.

Wheat

Varietal trials of spring and winter wheats have been continued at Lincoln, Alliance and North Platte. Two hybrid strains, CI 12128 and 12500, have given high yields for the second year. CI 12128 is resistant to leaf rust but moderately susceptible to stem rust; CI 12500 is stem rust resistant but shows susceptibility to leaf rust.

Oats

Nine varieties, developed during recent years within the state, are recommended on a regional basis.

Selections of hybrid origin proved resistant to Victoria blight and a new race of crown rust, prevalent during 1949. CI 4673, grown for the first time in field plots, outyielded all other varieties; it has a high degree of resistance to stem and crown rusts.

Barley

Frontier (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 22) is recommended to growers for irrigated areas in western Nebraska, where its yields are equal to those of Trebi. It has been placed on the Nebraska list of certified varieties.

Two new selections, Velvon BC 4-51 and 4-68, may replace Velvon 11 and Ezond as they possess the desirable characteristics of the two latter varieties, combined with stiffer straw, and awns which are more readily detached during threshing.

Greater importance is attached to the development of improved barley varieties for irrigated regions. Several promising selections are being tested at Scottsbluff.

Frost resistant winter barley selections, with greater hardiness than Reno and Ward, are being investigated at Lincoln and North Platte.

Maize

More efficient methods of selecting superior inbred lines for hybridization are being sought.

In addition to the usual single and double crosses, top cross tests were carried out to determine the combining ability of many new lines.

Numerous genes, desirable for the breeding programme, are being incorporated by back-crossing to four inbred lines, N 6, L 289, N 75 and K 41, adapted to Nebraska conditions. After several back crosses, the progenies will be selfed to obtain the required degree of homozygosity. Another group of inbreds are being selfed each year to maintain homozygous material for future use.

Investigations of female sterility in the popcorn line SA 24 have been carried out. The results indicate that female sterility is determined by a gene complex; SA 24 appears to be heterozygous in respect of the genes involved.

The frequency and type of mutation in pollen, caused by irradiation from a nuclear reactor, have been studied in the F_1 progenies of the single crosses L 289 x I 205 and CC 5 x L 289; the plants have been selfed so that the F_2 can be analysed. Normal plants pollinated by the F_1 individuals have produced progenies containing 45% abnormal plants with respect to pollen anomalies.

The degree of sterility in plants with newly acquired translocations is being determined; those plants having less than 50% sterility will be used for breeding purposes.

During a severe attack by the European corn borer in 1949, several new hybrids, including Nebraska 701 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1280), showed a high degree of tolerance. Three promising yellow hybrids, Nebraska 893B, 1219B and 1372A, have been released for trial by farmers; seed of two white hybrids, Nebraska 801 W and 5059 C, has also been released in limited quantity. Iowa 4417 is recommended as an early maturing hybrid suitable for dry farming in the Panhandle region; it has outyielded Dawes 2. Yield data are presented from trials at North Platte under irrigation.

Sorghum

The results of varietal trials of grain and forage sorghum at Lincoln, North Platte, Alliance and Hastings are reported. The new combine variety Norghum (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1656) has been placed on the Nebraska list of certified varieties recommended for western and northern areas; it outyielded all others tested at Alliance. Two combine kafirs from Texas have shown promise in the southeastern chinch bug region.

Forage grasses

Numerous native strains of *Agropyron*, *Andropogon*, *Panicum virgatum*, *Bouteloua curtipendula* and *Eragrostis*, collected from different parts of Nebraska, are being evaluated; those showing promise will be used to breed varieties for the increasing acreage of sub-marginal cropped land.

Forage legumes

Hybrid vigour has been demonstrated in lucerne by subjecting two selected clonal lines, having good combining ability, to natural hybridization. Single crosses thus obtained have outyielded standard varieties by 10 to 15%. Comparative data involving two generations show a significant yield reduction of 7.5% in the F_2 . Although multiple line hybrids, obtained by intercrossing four or more superior clones of good combining ability, possess less hybrid vigour in the F_1 than single cross hybrids, they continue to outyield standard varieties in advanced generations.

Attempts are being made to obtain hybrids between *Melilotus messanensis* (coumarin free) and *M. officinalis*. Many lines from Wisconsin, almost free of coumarin, are lacking in vigour; they are being back-crossed to vigorous varieties. A small number of anthracnose (*Colletotrichum Trifolii*) resistant plants from the synthetic fine stemmed N 1 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1280) are to be crossed with lines having low coumarin content; it is hoped that both characters will be combined in one strain.

Hybrids with large seeds are being sought among the progenies of large seeded species, *M. italica*, *M. speciosa*, *M. sulcata* and *M. messanensis*, crossed with the commonly grown white and yellow flowered varieties.

An analysis of interspecific hybrids between *M. alba*, *M. suaveolens* and *M. polonica* has revealed that pollen abortion in the F_1 depends on factors other than meiotic irregularities.

Potato

Breeding has continued for an early maturing variety with red skin, superior cooking quality and resistance to scab. Many crosses have been made between lines possessing one or more desirable characters; promising seedlings have been undergoing adaptability trials.

The relative performances of Progress (cf. Abst. 1973) and White Cloud are reported from different regions of Nebraska. White Cloud produces attractive tubers of uniform size and superior cooking quality; it appears to be well adapted to central and eastern Nebraska. Very few varieties from other states have given satisfactory results when grown in Nebraska. Several unnamed red and white lines developed locally have shown promise.

Sweet potato

An analysis of the food value of varieties grown in different areas has continued. Seedling selections from Oklahoma grown at Lincoln had a higher carotene content than commercial varieties; wide variations were noted in the ascorbic acid content of the selections.

Flax

Yield differences are recorded from varietal trials at Lincoln.

Castor bean

Two methods have been proposed for utilizing male sterility in the production of F₁ hybrid seed (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1280). Research is now in progress to determine the general and specific combining ability of several high yielding lines.

Sesame

An indehiscent line has been obtained; investigations are under way to determine whether the nonshattering character can be combined with high yielding ability and adaptation to combine harvesting.

Safflower

A back-crossing technique is being used to combine rust resistance with a high oil content. Three varieties, N-3, N-6 and N-8, have been added to the certified list; they have given oil yields of 29, 32 and 34%, respectively.

Apple

Scions of Golden Delicious on Virginia Crab interstocks proved to be higher yielding than those top-worked on Hibernial while some on seedling roots gave intermediate yields; the reverse was true for Jonathan scions.

Walnut

With respect to yield, quality and resistance to shrivelling, Edras and Hepler proved superior during 1949.

Strawberry

Varietal trials have been continued.

Grape

The winter hardiness of many varieties grown commercially in other states is being tested.

Onion

During comparative trials of hybrid lines and several standard varieties, the hybrids avoided thrip damage by early maturity.

Lettuce

The results of varietal trials are reported.

Musk melon

Iroquois, Early Sunrise and Pride of Wisconsin have shown promise in trials at Florence, Neb.

Squash

Ascorbic acid contents were recorded for the varieties Butternut, Table Queen and Rainbow, averaging 16.6, 17.6 and 34 mg. per 100 gm., respectively.

Tomato

Progress has been made in developing hybrids between *Lycopersicon peruvianum* and

commercial varieties of *L. esculentum*, to combine the high ascorbic acid content of the former with the other acceptable fruit characters of the latter.

Several varieties and advanced lines were tested for adaptability to five different localities. Sioux gave satisfactory yields in all regions. A selection with dense foliage from Red Cloud x Rutgers produced good yields of high quality fruit. Segregates from Red Cloud or Sioux crossed with types having dense foliage are well adapted to the Great Plains area; they are protected from sunburn by luxuriant foliage. The progeny of Red Cloud x Illinois 698-228 contained an early maturing individual suitable as a garden type. Selections from Red Heart x Pan American have given solid elongated fruits which are ideal for slicing; they ripen at the same time as Sioux.

Bean

Genetical analyses of populations for reaction to halo blight are in progress. A wax bean selection which has shown a moderate degree of resistance to halo blight under irrigation is being tested for adaptability throughout Nebraska. Two selections appear to be tolerant of common blight.

Soya bean

Hawkeye and Lincoln have replaced many older varieties by their outstanding production of beans with high oil content, but several experimental strains exceeded them in yield during uniformity tests at Lincoln.

Pea

Varietal trials have been continued. P 17, developed at Charleston, S. C., is a promising variety for Nebraska.

2471.

Biennial Report of the Utah Agricultural Experiment Station 1948-50.

Bull. Utah Agric. Exp. Sta. 1950 : No. 343 : Pp. 62.

Breeding and genetical projects in progress are listed. The following work is referred to in detail:—

Barley

The new variety Bonneville has been released in both Utah and Oregon (cf. Abst. 1689).

Lima bean

Lines with a high degree of resistance to seed rot have been discovered and are to be used in breeding.

2472.

Labor de la Dirección General de Fomento Agrícola en el año 1949. (Work of the General Office for the Promotion of Agriculture in the year 1949).

Bol. Produc. Fomento Agríc. 1950 : 2 : No. 15 : 20-29.

The work reported includes the inspection of crops for seed, the registration of new varieties and the suppression of certain old ones from the state register, the issue of official descriptions of the new varieties registered, the multiplication of seed of the official varieties, seed inspection for purity, germination and health, inspection of the production of hybrid maize and instruction of the farmers in its use. Lists are given of the varieties of cereals, flax and sunflower registered definitively and those registered provisionally. Results of tests of various forage plants are reported, including varieties of lucerne and sorghum.

2473. McINTOSH, A. E. S.

Annual Report of the Department of Agriculture, Federation of Malaya for the year 1949 (1951) : Pp. 87.

Varietal trials of the following crops are reported from numerous farms and stations: derris, maize, potato, sweet potato, ramie, Manila hemp, tapioca, tea, cocoa, pepper, citrus

fruits, bread fruit, Anonaceous fruits, mango, cashew nut, groundnut, coconut, mangosteen, avocado, banana, various green vegetables, squash, cucumber, and beans including soya bean.

Rice

Although occasional hybrids were observed in plots grown to determine the frequency of natural crossing, results indicate that the degree of outcrossing will not impair normal selection work, which has been continued at many stations.

Oil palm

Statistical analyses of yield and fruit characters have been made at Serdang to determine the degree of variation, with the object of improving selection techniques. The dumpy variety E 206 has been selfed and crossed with two tall forms, E 268 and E 152, to produce sufficient progeny for a genetical analysis of the inheritance of dumpiness.

Several varieties imported from West Africa are of the thin shelled or shell-less type; their average yield is considerably below that of local varieties.

Selection of palms bearing fruits with oil of high carotene content is continuing; from many crosses between desirable parents only 25% of the progeny have oil of equally high quality.

2474.

Crop Research Division Lincoln, New Zealand Guide 1950-51.

Dep. Sci. Indust. Res., N.Z. Pp. 27.

The main objectives of the New Zealand Crop Research Division, formed by amalgamating the Agronomy Division of the Department of Scientific and Industrial Research with the wheat breeding section of the Wheat Research Institute, are briefly summarized. Crop improvements made in New Zealand during the past 100 years are outlined, followed by detailed descriptions of breeding work now in progress.

Wheat

A few advanced lines of the general purpose type Cross 7, tested at several stations for yielding capacity, have consistently outyielded Cross 7. Two promising lines, adapted to land of high fertility, have shown high yielding ability combined with stiff straw and tight chaff.

Selections from Hilgendorf and hybrid lines from Hilgendorf x Cross 7 are being tested for a high quality and yield superior to Hilgendorf.

Mildew resistance is being sought among progeny of 17 resistant imported varieties crossed with Hilgendorf, Cross 7, Tainui, Tuscan, Fife-Tuscan and WRI-Yielder.

Investigations of the inheritance of kernel weight and resistance to grain shattering are in progress. Further studies are concerned with methods of back-crossing and selection and the average yielding capacity of hybrid mixtures. Cytogenetical investigations of chlorophyll defective mutants and the origin and nature of basal-sterile speltoids are being made.

Oats

Selections for lodging resistance are being made from the progenies of the high yielding varieties Abundance, Onward and Royal Scot, crossed with the short, stiff strawed Welsh oats, S 147, 172, 221 and 225.

Rust epidemics have been artificially created at the Lincoln nursery to test the resistance of hybrids produced by crossing the North American types, Victoria, Bond, Richland, White Russian, Clinton and Achilles, with Onward, Abundance and Algerian.

Rye

Some 96 selections from the variety NIAB have been grown in 12 replications to observe the effects of the polycross method of improvement.

Barley

Selections from the variety Research have been divided into three groups in respect of maturity, comprising early, midseason and late types. Bulk seed from the midseason group has outyielded both early and late forms and the original line. The stiff-strawed Scandinavian variety Herta is undergoing yield tests before its release. Hybrids derived

from crosses between Golden Archer, Plumage Archer, Spratt Archer and the Scandinavian varieties Kenia and Maja are being tested for resistance to lodging and neck break.

Forage legumes

Recent selections from the variety Marlborough (*Medicago sativa*) are undergoing yield trials; it is hoped that several improved hay strains will be obtained. Crosses have been made between *M. glutinosa*, of low growing habit, and the upright variety Marlborough to produce improved grazing strains; open-pollinated progeny from F₂ selections are under observation. Lucerne breeding material has been supplemented recently by 40 introduced varieties.

Rape

A form resembling Broadleaf Essex with a degree of resistance to *Plasmodiophora Brassicae* equal to that of Clubroot-resistant is being sought from crosses between these varieties. Progenies of plants resistant to aphis, obtained from crosses between Calder swede (resistant) and Clubroot-resistant rape are under observation.

Swede

A promising new hybrid from Calder x Danish Giant is undergoing further trial.

Potato

Indicator varieties from Scotland are being used to identify the strains of *Phytophthora infestans* present in New Zealand. Breeding for resistance to mosaic viruses X and Y, the leaf roll virus, scab, frost and drought is in progress.

Varietal differences have been observed in the capacity for retaining vitamin C during storage.

Flax

Several selections resistant to the races of *Melampsora Lini* prevalent in New Zealand have been made from introduced varieties. In attempts to transfer their resistance to Liral Crown, a widely grown variety, many crosses and back crosses are being carried out.

Hops

Newly imported strains with resistance to black root rot (*Phytophthora* sp.) from Great Britain, Japan, USA and Canada are under quarantine restrictions prior to release as breeding material. It is hoped that they will be crossed with the susceptible standard variety, Californian, to combine their resistance with the desirable characters of the latter.

Linseed

Koto, Rio and Cheyenne have proved resistant to New Zealand races of rust. Breeding is being continued for a rust resistant, early maturing variety for the Southland area as a substitute for the susceptible Bison, and a rust resistant variety of medium maturity for North Otago and Canterbury, where the susceptible Golden Viking is widely grown.

Carrot

Breeding and selection for strains of Holmes Improved with successive maturity dates are in progress. The variety was intended as a field carrot, but has shown freedom from woodiness combined with sweetness and a delicacy of flavour acceptable in a garden form.

Onion

Male sterile lines of Pukekohe Longkeeper are being developed in order to increase yields by hybridization.

Cabbage and cauliflower

A wide range of strains is being sought with successive maturity dates throughout the winter. The intensive breeding programme includes self fertilization and pair crossing. Inbred lines with increased uniformity may show loss of vigour and ultimate intercrossing may be necessary to form one vigorous strain.

Kale

Hybrids between chou-moellier and thousand-headed kale have been obtained; their leaf yield equals thousand-headed kale and total yield approaches that of Giant chou-moellier. A promising hybrid with high leaf yields in late winter and early spring was produced by crossing chou-moellier and winter cabbage.

Tomato

Thirty strains have been selected for further trial in respect of earliness combined with good quality and high yield. Plants with resistance to the spotted wilt virus are being sought.

Peas

Breeding for resistance to pea mosaic virus is in progress. Five selected resistant lines have been obtained from the susceptible Greenfeast and Greenfeast x Greatcrop crossed with William Massey and a Greenfeast rogue, which are both resistant.

Imported varieties with resistance to pea wilt have been crossed with the susceptible garden types William Massey, Little Marvel, Greenfeast and Onward, and the field types Partridge and Blue Prussian; back-crossing with the susceptible varieties is in progress. Progenies of other crosses, (Greenfeast x Greatcrop) x William Massey, Greenfeast x Blue Prussian and Partridge x Black-eyed Susan, are undergoing yield tests.

2475. PRESCOTT, J. A.

British Agricultural Research Stations. The Waite Agricultural Research Institute, Adelaide, South Australia.

Brit. Agric. Bull. 1951 : 4 : 62-67.

Work at the institute includes research on the principal plant breeding problems of the country, among which is the production of disease resistant strains of many economic crops. Particular use is being made of back crosses, concentrating on single desirable characters. More emphasis is being given to fundamental work in cytogenetics.

2476.

Report of the University of Hawaii College of Agriculture, Agricultural Experiment Station for the biennium ending June 30, 1950 (1951) : Pp. 173.

Forage grasses

Selections from polycrosses of standard Napier grass 34 : 18 and African Napier grass strains appeared to exhibit considerable hybrid vigour, but the actual yield data showed no significant difference between the mean of the polycrosses and the standard strain 34 : 18. Five selections of Napier grass, grown from seed obtained from elevations above 6000 ft. in East Africa, showed no marked superiority in yield over the standard strain 34 : 18 when grown at 3800 ft. at Olinda.

In yields of green forage and in growth behaviour, hybrid selections of cattail millet x Napier grass back-crossed to Napier grass outyielded the standard Napier grass during a period of two years at the Haleakala station. The declining yield from the hybrids with each successive crop indicates that hybrid vigour may not be maintained over a long period.

Under conditions of drought the hybrids were less resistant than the parent Napier grass.

Forage legumes

Selections are being made from the variable strains of *Cajanus indicus* in order to develop those with a continuous seeding habit combined with prolonged vegetative vigour.

Although the present strain of *Indigofera endecaphylla* grown in Hawaii appears to be a promising pasture legume for dairy cattle, evidence of toxic effects has been reported under certain conditions. Investigations concerning the toxicity of strains of *L. endecaphylla* and related species are being carried out; attempts will be made to develop a desirable non-toxic form.

Sweet potato

Breeding work is being carried out to produce varieties of good quality for baking and storage, with resistance to disease and insect pests. HES seedlings 12, 14 and 15 continue to outyield their parents (Nancy Hall and Porto Rico), producing tubers of desirable character, and are being used with HSPA 3 (an open-pollinated form of Pratt-Kaneohe) and the standard Porto Rico for tests of susceptibility to weevil, stem borer and leaf miner.

Studies of open-pollinated and self-pollinated seedlings of HES 48 (Nancy Hall x Porto Rico) are being undertaken to determine the inheritance of self fertility, colour of tuber skin and flesh, and degree of leaf lobing. Factorial analysis is complicated by the hexaploid nature of the cultivated plant.

Papaya

The progenies of inbred lines of Solo, crosses between inbred lines of Solo, and hybrids between Solo and various introduced varieties are being compared for adaptability to Hawaiian conditions. Although no introduced variety has equalled Solo in quality or size of fruit, some are more desirable in respect of bearing fruit on low branches, earlier bearing, thicker flesh and shorter internodes; these are being crossed with Solo to incorporate the best characters of each into a single new variety.

Genetical studies have been continued to determine the inheritance of carpelldody of stamens and the nature of gene complexes which influence sex expression and reversal.

Cabbage

By maintaining plants at about 38° F for 3 months the varieties Copenhagen Market and Green Acre were induced to flower. Cross pollination was effected between these two varieties of high quality and the Turkish forms Huguenot and Volga which have low quality but flower readily under cold conditions.

Cauliflower

From a group of Indian varieties, highly heterozygous for yield, earliness and other characters, several selections have been made with greater uniformity.

Lettuce

The best F₄ and F₅ lines from the cross Manoa x Great Lakes yielded progeny which possess a better leaf quality and mature from 9 to 10 days earlier than Great Lakes. Several promising F₃ lines have been obtained from a cross between a tipburn free form and a line which produces large heads having a high degree of resistance to bolting.

Water melon

Improvement of commercial varieties is being sought by crossing Congo with a wild inedible form resistant to cucumber mosaic. Progeny from the F₄ generation have been selfed and will be back-crossed to Congo.

Cucumber

The main objective in the breeding programme is the combination of resistance to downy mildew and mosaic disease.

Tomato

A line with resistance to bacterial wilt has been obtained from North Carolina; the fruits are small and of very little value. Crosses between this resistant line and large-fruited susceptible varieties have shown that resistance to bacterial wilt is inherited as a recessive factor. Attempts are being made to combine this resistance with resistance to spotted wilt, *Fusarium* wilt, *Stemphylium* leaf spot, nematode root knot and tobacco mosaic virus in plants which bear commercially desirable fruit.

Resistance to tobacco mosaic has been developed in certain lines. The young plants appear to be highly resistant but slight symptoms become visible when mature fruit are formed; these do not seriously affect plant growth.

A programme of continued back-crossing, selection and recrossing is being carried out among the offspring from the cross 2958 x P₆ in order to combine a high ascorbic acid content with other desirable fruit characters.

Bean

Progeny have been obtained in the F₄ of the cross Hawaiian Wonder x Alabama 1 which combine the nematode root knot resistance of Alabama 1 with desirable agronomic characters. Further selections are being made for rust resistance which should be inherited from the other parent.

Sweet corn

The most desirable combinations are being selected from some 160 single and top crosses in respect of productivity, quality and ear appearance. Although none is superior to

Golden Cross Bantam, several crosses outyielded USDA-34; their trimmed ears are longer, of more uniform thickness and contain kernels of a more golden, glossy appearance than the latter variety. Lines of unusual sweetness have been obtained from some 100 double crosses which have been selfed twice.

2477. JUCCI, C.
Un "Istituto di Tecnica Agraria N. Strampelli". (**A Technical Agricultural Institute named after N. Strampelli**).
Genetica Agraria, Roma 1950 : 2 : p. 316.

The new institute is situated at Lonigo, Vicenza, and under the direction of C. Maliani. It will be concerned with the genetic improvement of cultivated plants, especially wheat.

2478. ÅKERMAN, Å.
Jordbrukets växtodling. (**Agricultural crop production**).
Lantmannen 1951 : 35 : 240, 248.

This speaker at the Agricultural Week in Stockholm outlined the advances made in Sweden in the improvement of agricultural and horticultural crop plants by breeding and genetics, including the artificial induction of mutation and polyploidy. Future aims in breeding must take into account not only the growers' requirements in regard to quality, mechanized harvesting, reliability of yield, and resistance to drought, diseases, frost and unfavourable conditions at the time of ripening, but also the special requirements arising from the industrial utilization of certain crops, e.g. the production of oil and groats from barley and oats.

2479. HAAN, H. DE.
Der Einfluss des Mendelismus auf die Pflanzenzüchtung in den Niederlanden (1900-1950). (**The influence of Mendelism on plant breeding in Holland**).
Z. Pflanzenz. 1951 : 29 : 276-81.

Having described the techniques used in plant breeding in Holland before 1900, the author cites the pronouncements of various well-known Dutch breeders on the value of Mendelism in plant breeding. The final section of the paper asserts the confidence of Dutch research workers and breeders in the principles of genetics, with a criticism of Russian research as reflected in the Lamarckian views of Lysenko (cf. Absts 1475 and 1501).

2480. LEFÈVRE, J.
La protection des droits de l'obtenteur de nouvelles variétés végétales.
(**The protection of the rights of the breeder of new plant varieties**).
C.R. Acad. Agric. Fr. 1951 : 37 : 184-85.

BRACONNIER, R.
Des droits de l'obtenteur sur l'exploitation des variétés de plantes qu'il a créées et de la protection de ces droits. (**The rights of the breeder over the exploitation of plant varieties bred by him, and the protection of these rights**).
Ibid. 1951 : 37 : 185-89.

This is a preliminary contribution on the legal aspects of the claim put forward by French breeders to rights of ownership of new varieties or species bred by them.

2481. PAMMER, F.
Die staatliche Gesetzgebung zum Schutze der österreichischen Pflanzenzüchtung. (**The government legislation to protect Austrian plant breeding**).
Bodenkultur, Wien 1950 : 4 : 405-14.

The organization of plant breeding in Austria is discussed with reference to the 1945 law

for the protection of Austrian plant breeding. The methods of carrying out trials of varieties (1) for their inclusion in the Breeding Register and (2) for estimating their economic value, are described in detail.

2482. PORTÈRES, R.
Considérations sur le choix d'une méthode de sélection à adopter en Afrique Tropicale. Types d'agriculture et races cultivées. (**Considerations on the choice of a method of selection to adopt in tropical Africa. Types of agriculture and races cultivated**).
Cot. Fib. Trop. 1950 : 2 : 69-72.

Holding that the first results of introducing the use of pure lines of economic plants into primitive agricultures such as those of tropical Africa will be shortages and famines, the author shows that the stage of agricultural development and the type of cultivation, i.e. whether intensive or extensive, should be fully considered before a decision is reached on the use of pure lines or of composite varieties. The value of the composite variety, which represents a mixture of agrotypes, and its suitability for use in certain agricultural and economic conditions is emphasized.

2483. JANAKI AMMAL, E. K.
Chromosomes and horticulture.
J.R. Hort. Soc. 1951 : 76 : 236-39.

A popular account is given of the way in which the origin of cultivated plants can be traced by studying chromosome numbers. Mention is also made of the possibilities of improving the productivity of many economic plants by inducing polyploidy with colchicine.

2484. CRANE, M. B.
Masters Memorial Lectures, 1950. The origin and improvement of cultivated plants. Part II.
J.R. Hort. Soc. 1950 : 75 : 465-74.

A short account is given of gene action, methods by which polyploidy is induced, hybrid vigour and breeding for combination of desirable characters, with numerous references to economic plants (cf. Abst. 1290).

2485. GRADOV, A.
(**Seed growing on a collective farm**).
Kolhoznoe Proizvodstvo (Collective Farming) 1951 : No. 3 : 28-30.
[Russian].

Mičurinite seed growing practices with cereals, forage plants and sunflower in the Stavropolj territory are described. The results of seed analyses of several varieties of cereals and one sunflower and of varietal trials with wheats are reported. Trials of the winter wheats, Hybrid 481, Novoukrainka 83 [New Ukrainian 83] and Kubanskaja 122 [Kubanj 122] which outyielded Vorošilovskaja in 1950 are in progress. Kubanskaja 122 is a promising new variety bred at the Kubanj Research Station.

Breeding work at the collective farm included a maize cross, Minnesota 13 Extra x Gruševskaja, as a result of which a large quantity of hybrid seed became available. Experiments are in progress with perennial rye grown for forage in mixed fields with lucerne.

The sunflower variety VNIIMK 1646 is being grown from élite seed reproduced at the collective farm.

2486. BARNES, H. V. and
ALLEN, J. M.
A bibliography of plant pathology in the tropics and in Latin America.
Bibliograph. Bull. US Dep. Agric. 1951 : Pp. 78.

The bibliography covers literature published during the period 1937 to 1949 and contains 2395 references, including papers on disease resistant varieties of the chief crops.

2487. AUFHAMMER, G.
Die Bedeutung der Pflanzenzüchtung für die Bekämpfung der Pflanzenkrankheiten. (**The importance of plant breeding for the control of plant diseases**).
Landw. Jb. Bayern 1949 : 26 : No. 11/12 : 86-94.

A brief review is given of the main fungous diseases of agricultural plants in Germany, the damage they cause, and the measures for controlling them. Breeding resistant varieties has been much hindered by the existence of several physiological races of important fungi such as mildew and rusts of cereals and potato blight, by the capacity of the biotypes to mutate and the complex genetical nature of resistance in many resistant forms. By repeated back-crossing of hybrids of *Triticum persicum* var. *rubiginosum*, mildew resistant spring wheats with good agricultural qualities have been produced at Weißenstephan. Mildew resistance has been introduced into winter wheat by wheat x rye crosses and into malting barley also by wide crossing.

Wheats with combined resistance to yellow, brown and black stem rust selected from crosses with the emmer series in America are being grown with advantage in areas with the highest rust attack and promising results of wide crossing in certain other crops are also mentioned.

2488. ARMITAGE, H. M.
Susceptibility of California fruits and vegetables to attack by the oriental fruit fly (*Dacus dorsalis*).
Bull. Calif. Dep. Agric. 1951 : 40 : 12-20.

The relative attractiveness of commercially grown varieties of cotton, pome, stone and small fruits, nuts and vegetables to *Dacus dorsalis* was determined and compared with that of local hosts during tests under natural epidemic field conditions in the Hawaiian islands and in laboratory cages.

2489. **Proceedings and Abstracts of the Fourth Western Canadian Weed Control Conference Saskatchewan November 21st, 22nd, 1950 (1951) : Pp. 177. (Mimeographed).**

Olson, P. J. *The effect of chemicals on wheat. (pp. 1-2).*

The reactions of wheat varieties at different growth stages to applications of herbicides are summarized.

Friesen, H. A. *Effect of 2,4-D on three varieties of wheat. (pp. 4-5). (Abst.).*

Differential responses towards ester and amine sprays of 2,4-D, in respect of minor head and glume deformities and yield reductions, are reported between Thatcher, Rescue and Pelissier at Scott, Sask.

Olson, P. J. and *Differential response of wheat varieties to 2,4-D. (p. 6). (Abst.).*
Breakey, W. J.

Although statistically significant yield reductions have been observed in Stewart and Thatcher at Headingley, Man., after treatment with an isopropyl ester and an alkanolamine

of 2,4-D the average yield reduction for different application rates at two separate times shows no significant difference with respect to the rates. In conjunction with results from tests at Morden, these observations suggest that there is inconclusive evidence for a differential varietal response.

Unrau, J. and *Cytological and physiological effects of 2,4-D*
Corns, W. G. *applied to cereal grains at different stages of growth.*
 (p. 11). (Abst.).

After treating Olli barley with 2,4-D at certain growth stages, cytological investigations at Alberta University have disclosed numerous meiotic irregularities, including polyploidy, aneuploidy, fragmentation, asynapsis and chromosomal stickiness. The genetic constitution of progeny from treated material is being determined. Similar investigations with Stewart and Thatcher wheats are in progress.

Davidson, J. G. *Effect of 2,4-D on spring planted oats when applied*
 at four rates and three different growth rates.
 (p. 11).

Exeter has shown greater tolerance to 2,4-D than Ajax, Fortune or Vanguard, in respect of yield reduction, lodging and delayed maturity at Indian Head, Sask. A large number of abnormal heads developed in Vanguard.

Davidson, J. G. *The effect of chemicals on oats. (pp. 11-15).*

Although many forms of oats show varied reactions to treatment with 2,4-D at certain growth stages, detailed data from numerous locations in Canada show inconsistency in the degree of varietal tolerance.

Friesen, H. A. *Effect of 2,4-D on spring oat varieties. (p. 17).*
 (Abst.).

At Scott, Sask., Fortune was the most tolerant variety on the basis of yield. Sterile spikelets were very abundant in Ajax and Exeter, and maturity was delayed in the latter variety.

Olson, P. J. *Differential response of oat varieties to 2,4-D.*
 (p. 17). (Abst.).

At Winnipeg, Man., the varieties Ajax, Vanguard and Exeter were sprayed with 2,4-D at two different growth stages. After the first date Vanguard showed a reduction in yield, whereas at the later stage Exeter was the only variety affected.

Foster, J. R. *Effect of 2,4-D on barley varieties, 1950. (p. 23).*
 (Abst.).

Data are presented concerning the delay in heading during 1949 and 1950 after spraying 14 varieties at the five-leaf stage at Regina, Sask. The two year average indicates that Vantage is most susceptible.

Friesen, H. A. *Effect of 2,4-D on spring barley varieties. (p. 24).*
 (Abst.).

After spraying Vantage, Velvon and Titan at Scott, Sask., maturity was delayed by one day in Velvon and Vantage; on the basis of yield Vantage was most affected.

Olson, P. J. *Differential response of three varieties of barley to*
 treatment with 2,4-D. (p. 25). (Abst.).

No significant differences in yield were observed after treating Montcalm, OAC 21 and Vantage with two concentrations of alkanolamine and isopropyl ester of 2,4-D at Winnipeg, Man., on two occasions.

Chubb, W. O. *The effect of chemicals on flax. (pp. 26-28).*

Varietal differences in resistance to damage by postemergence treatment with 2,4-D, MCP, 2,4,5-T and preemergence treatment with TCA are reported.

Breakay, W. J. *Effect of 2,4-D on two varieties of flax.* (p. 28).
(Abst.).

Yield reductions observed in the varieties Dakota and Rocket at Morden, Man., differed only slightly.

Coupland, R. T. and *Differential response of six varieties of flax to*
Alex, J. F. *2,4-D.* (pp. 29-30). (Abst.).

The varieties Victory, Redwing, Royal, Dakota, Rocket and Arrow are listed in order of increasing susceptibility on the basis of yield reductions after spraying tests carried out at Saskatchewan University. With respect to increasing delay in maturity the same varieties are listed as follows: Rocket, Dakota, Victory, Redwing, Royal and Arrow.

MacKey, E. M. and *Effect of 2,4-D on fibre flax—1949.* (p. 31).
Chubb, W. O. (Abst.).

There were no differences in yield or fibre quality between Liral Dominion, Liral Prince, Toba and Royal subjected to treatment at different growth stages at Portage la Prairie, Man.

Olson, P. J. *Differential response of three varieties of flax to*
treatment with 2,4-D. (pp. 33). (Abst.).

Although no significant yield reductions occurred in either Sheyenne or Dakota after treatment at Winnipeg, Man., Royal showed marked reduction in yield.

Leggett, H. W. *The effect of chemicals on legumes.* (pp. 34-38).

As numerous inconsistencies in the reactions of lucerne, alsike, sweet clover and field peas to various chemicals have been observed in different localities, no definite recommendations can be given either for or against the use of herbicides on legume crops.

Friesen, H. A. *Effect of 2,4-D on two varieties of strawberries.*
(p. 99). (Abst.).

Slight differences were observed in the reactions of Dakota and Dunlap to 2,4-D at Scott, Sask.

2490. HÖPPNER, E.
Was kann die Praxis von der Sortenversuchsarbeit erwarten? (**What can practical farming expect from variety testing work?**)
Kartoffelbau, Hamburg 1951 : 2 : 18-20.

It is explained that variety testing in Germany comprises two activities: testing for authenticity and testing for cultural value. The introduction of the National Variety Register reduced the number of potato varieties on sale from 577 to 66, and similar reductions have been effected in other crops. Information is provided on the merits of new varieties, assessed by comparative tests of such features as yield, standing capacity, disease resistance and quality.

2491. SKAARE, S.
Årsvekst og avling på Vidarshov 1950. (**The harvest and production at Vidarshov 1950**).
Samvirke, Med. Felleskjøpet, Oslo 1951 : 46 : 19-22.
Årsmelding om Felleskjøpets virksomhet i 1950. (55 driftsår).
[**Annual report on the work of the Cooperative Society in 1950 (55th year)**].
Ibid. 1951 : 46 : 181-90.

In the first of these two reports from the Vidarshov Experimental Farm the performance of Norwegian and other varieties of oats, barley, spring and autumn wheats, potatoes and fodder and sugar beets is recorded. The barleys Herta (cf. Abst. 1846) and the

Norwegian Mø 1435 (Domen), both of which yielded well, particularly as a result of their strong straw, receive special mention.

The second report contains a section amplifying the first by a tabular survey of data from Vidarshov Experimental Farm on seed multiplication, elite seed production and the raising of pure seed of various crops, including barley, wheat, oats, peas and potatoes. The experimental plots also include trials of hybrid maize for forage and tests of sweet lupin strains and virus-free strains of potatoes.

2492. HOLME HANSEN, H. H.

Lokale Forsøg og andre Planteavlsarbejder. (**Local trials and other activities in plant cultivation**).

Beretn. Planteavl. Lolland-Falster 1949 : 14-100.

Detailed reports are given on trials at various Danish experimental stations where Danish and other varieties and strains of clover, lucerne and cereals, including wheat, oats and barley were tested.

Results from A. Nielsen and Co.'s scutching mills are also recorded where the flax varieties Concurrent, Hareskovgaard, Liral Sussex, Formosa and Percello were compared as regards yield of seed, scutched flax and tow.

2493.

Official Virginia varietal tests—1950. Field crop recommendations for 1951.

Bull. Va. Agric. Exp. Sta. 1951 : No. 445 : Pp. 18.

Varietal trials and the resulting recommendations are reported for cereals, lucerne, red clover, cotton, tobacco, groundnut and soya bean.

2494. McMURRAY, S. F.

1950 variety performance trials of field crops.

Bull. Tenn. Agric. Exp. Sta. 1951 : No. 218 : Pp. 16.

The results of varietal trials of wheat, oats, maize, barley, red clover, lucerne, cotton and soya bean at several centres in Tennessee are recorded.

2495. GRIESBECK.

Vertikale Gliederung im Sortenversuchswesen. (**Vertical grouping in the organization of variety testing**).

Neue Mitt. Landw. 1951 : 6 : 35-38.

In Germany the Variety Department for Economic Plants has to carry out the testing of new breeding material which the breeders ask to have approved. Testing of claims of novelty and constancy is carried out in addition to yield trials. Then further confirmatory tests follow throughout the country to find out the effect of climate and soil on the varieties. The author considers that after the above series of officially controlled tests the so-called observation experiment is necessary in large scale cultivation of varieties where quality is important, e.g. for brewing, malting, etc., so that the effects of soil, climate and field variations may be observed in places and on land not included in the official tests. Thus the series of tests recommended comprises the official variety trials, the provincial variety trials and finally, based on the results of these, the observation test.

2496. HAAN, H. DE.

Wageningen als landbouwkundig centrum. (**Wageningen as an agricultural centre**).

Jaarb. Algem. Bond Oud-leerl. Middelbaar Landbouwonderwijs, Wageningen 1950 : 5-20.

This account deals with the early history of agricultural instruction in Holland; with the formation of the Wageningen Agricultural Experimental Station and of the Agricultural

College; and with their subsequent organization and development as part of the nexus of research institutes and other bodies concerned with many diverse branches and subjects of agricultural study in relation to plant and animal production.

CEREALS

2497.

Recommended varieties of grain crops for Saskatchewan for 1951.

Saskatch. Co-op. Agric. Ext. Programme 1951 : Pp. 7.

Varieties of wheat, oats, rye, barley, flax and field peas and beans are recommended for cultivation in Saskatchewan. A map is given indicating the cereal variety zones of the Province as determined by soil and climate.

2498. KIRSTE, A.

Entwicklungslinien in der Züchtung von Getreidesorten. (Developmental trends in the breeding of cereal varieties).

Neue Mitt. Landw. 1951 : 6 : 101-02.

Varieties of rye, winter and spring barley, winter and spring wheat and oats are described, the trend in the breeding of each cereal being briefly indicated.

One of the newer ryes, Heines Hellkorn [Heine's Bright Grain], with green cotyledons, is not superior in yield to Petkus, but owing to its thin seed coat the flour yield is high. When Heines Hellkorn is crossed with other varieties, cases of xenia in the hybrid may be observed. As regards the selection of ryes for short straw, it is pointed out that this character is usually found with a short ear and hence with lower yields; moreover, as in the case of Carsten Kurz [Carsten Short], shorter straw is not always accompanied by higher resistance to lodging.

Two new winter barleys Atlas von Breustedt and Dippes Herfordia that appeared in 1950 are still being tested.

The latest aim in breeding winter wheats is an exceptionally high resistance to lodging. Heine VII, released in 1950, is the first variety exhibiting this character and it is hoped that it will tolerate maximum nitrogen manuring.

Breustedts Teutone [Breustedt's Teuton] is a spring wheat which was originally completely immune from loose smut and is still regarded as practically immune, though infected ears have since been found occasionally. The new selections Peragis II and Peragis Garant are still being tested for yield.

Amongst the spring barleys, released since 1945, which are provisionally regarded as mildew resistant are Vogels Weihenstephaner, Haarer Isdania, Strengs Franken, Firlbecks Weihenstephaner and Heines Haisa II. A mildew resistant strain of Isaria is being tested. Morgenrot [Morning Glow] is an early ripening variety which tolerates extreme conditions and inferior soil.

The newer oat varieties Carsten VII and Ebstorfer Braun show high tillering capacity and high yields. The latter, a hybrid from black and white oats, is the first oat variety with brown glumes. In 1950 a naked oat variety was admitted to the Variety Register for testing. A strain of Breustedt oats has been found which is resistant to germination in the ear and will be used for breeding.

Resistance to frit fly, tolerance of late sowing and delayed germination are, in conjunction with high yield, the future breeding aims.

2499. HOFFMANN, W.

Erfolge und gegenwärtiger Stand der Hallenser Arbeiten zur Kombinationszüchtung bei Getreide. (Achievements and present state of the work at Halle on hybridization breeding in the case of cereals).

Z. Pflanzenz. 1951 : 29 : 318-45.

Past and present work on winter and spring wheats, winter and spring barleys and oats is reviewed in detail, with a tribute to Roemer's work. The survey shows how far combination

of various valuable characters has been successful. Breeding methods are described and the difficulties encountered in breeding for winter hardiness and resistance to lodging and various diseases are explained, with special reference to conditions in Germany. New field methods of selection are being worked out to overcome difficulties due to the rarity of severe winters.

The successes attained in breeding for resistance to diseases in the various cereals are described in detail, the genetic origin of the varieties being given. Fat content is now being included in the breeding aims for oats.

2500. **LYSENKO, T. D.**

(Some new ideas in the science of biological species).

Doklady Vsesojuz. Akad. Sel'sk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1950 : No. 12 : 3-13. [Russian].

An outline of Mičurinite evolutionary theories, including Lysenko's definition of the term species, is given. Changes in external conditions and metabolic processes of organisms are regarded as the principal reasons for variation of forms within a species and for conversion of some species into others. The following remarkable instances of conversion are listed:—

In experiments with hard wheat conducted in 1948 by V. K. Karapetjan, *Triticum durum*, a wheat with 28 chromosomes, changed into *T. vulgare* having $2n = 42$.

In 1949, a systematic search was made for rye grains in the ears of wheat in districts where wheat fields show frequent unexplained admixtures with rye. Over 200 rye grains were found in the ears of *T. durum* and *T. vulgare*. These grains when planted gave mostly rye plants. Only in a few instances were wheat plants obtained from the grains of the rye type found on wheat.

Material studied at the Lenin Academy of Agricultural Sciences in 1949 included *Avena sativa* plants whose panicles contained individual *A. fatua* grains. Frequent contamination of fields of the branching wheat *T. turgidum* with other wheats, oats, two-rowed and four-rowed barley and spring rye at the Lenin Agricultural Academy and elsewhere in the USSR have been reported. Mention is made of barley plants obtained in 1950 in a *T. turgidum* field from seed of the branching wheat.

Arguments are put forward why none of the above instances of changes of a species into another can be attributed to either hybridization or to mechanical impurity of the experimental material.

2501. **MIÈGE, E.**

Les céréales secondaires en Afrique du Nord. (The secondary cereals in North Africa).

Rev. Bot. Appl. 1950 : 30 : 555-78.

A discursive and detailed review is given of the barleys, oats, rye, millet and canary grass grown in Morocco, Algeria and Tunis, with information on the different lines that have been followed from time to time in selection or breeding of these secondary cereals in the above three countries.

2502. **ŠEFRÁNEK, B.**

Vliv kyslíku peroxydu vodíku na klíčivost, růst a vývoj některých druhů a odrůd rostlin. (The effect of hydrogen peroxide upon the germinating capacity, growth and development of some species and varieties of plants.)

Sborn. Českosl. Akad. Zeměd. 1951 : 23 : 320-27.

The effect of treatments with hydrogen peroxide upon the development of seed, shoots and roots of various economic plants, including wheats and rye, was studied at the Research Institute for Botany at Brno. The results suggest varietal and specific differences in response to varied concentrations of hydrogen peroxide; its inhibiting effect upon root development was more marked in dicotyledonous than in monocotyledonous plants.

2503. LJVOVA, I. N.

(Some questions of fertilization cytology and fertilization physiology in cereals).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9.
11-23. [Russian].

The results of a study of wheat and rye at the Moscow State University are reported. The material included several varieties of *Triticum vulgare*, *T. Timopheevi* and the hybrids from *T. durum* x *T. Timopheevi* and *T. turgidum* x *T. Timopheevi*, and the winter rye Timirjazevka [Timirjazev].

Physiological differences between the morphologically uniform cells of stigma segments in cereals were observed. They became apparent during the early stages of growth. The segments of rye stigmas showed greater physiological variation than those of wheat stigmas.

Individual pollen grains produced in the same anther had different physiological properties. The following changes were observed in the tissues of pollen several minutes after its contact with the stigma of the same variety; the plasma became more permeable, and oxidation processes in the nucleus more active and the intensified neutralization activity that followed resulted in a cell condition resembling that of paranecrosis.

In distant hybridization, oxidation processes are so active that metabolism between the pollen tube and cells of the stigma is disturbed, and the pollen tube ceases to grow.

Low fertility of interspecific wheat hybrids having an open type of flower is due to development in the hybrids of properties inherent in cross-pollinating plants and to disturbed oxidation and neutralization processes in the pollen grains.

2504. *LIEPIŅŠ, K. and

CĒBERS, K.

Kolchozu Mičuriniešu Laboratoriju pirmā darba gada rezultāti. (Results of the work of the Mičurinite Laboratories in collective farms of the Latvian SSR in 1949).

Latv. PSR Zinātņu Akad. Vēstis 1950 : 2 (31) : 45-80.

The paper deals principally with agronomic experiments carried out in Latvia according to Mičurin-Lysenko methods. The work reported includes fertilizer trials of cereal and potato varieties, application of Musiko's rope method of supplementary pollination of rye (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 826) and study of gooseberry varieties raised by A. Viksne.

The following are among the gooseberries which have shown promise: Seedling 49 of Amerikas Kalnu [America Hill]; a hybrid between Roaring Lion and Pellervo 1; and a variety derived from Whinham's Industry x *Ribes rotundifolia* x Maurera Seklandzis [Grass Seedling].

2505. RAMANUJAM, S.

Lodging in cereals and the possibilities of breeding for resistance.

Indian J. Genet. Pl. Breed. 1950 : 10 : 78-95.

The genetics of resistance to lodging are reviewed and methods of combining resistance with other desirable characters are suggested.

2506. LASSER, E. and

AIGNER, H.

Ergebnisse der Getreidesortenversuche des Anbaujahres 1949-50 in Kärnten. (Results of cereal variety trials in Carinthia for the 1949-50 season).

Kärntner Bauer 1951 : 101 : 109-10.

Yield figures are given for winter rye, winter barley, winter wheat, spring wheat, oats and spring barley. Varieties which gave good results after the exceptionally hot, dry summer

* An abridged translation of this paper is on file at the Bureau.

of 1950 included Dr. Lassers Dickkopf [Dr. Lasser's Squarehead] winter wheat, Janetzki's Jabo and Lichti spring wheats, and Haisa spring barley.

2507. PFEIFFER, R.
 Ergebnisse langjähriger Getreidesortenversuche im alpinen Raum.
(Results of many years of cereal variety trials in the alps).
 Veröff. Bundesanst. alp. Landw. Admont 1951 : No. 4 : 20-42.

The results are given of 114 cereal variety trials carried out by the Admont Federal Institute for Alpine Agriculture, during 1939-49 in various alpine districts and at various altitudes, with the aim of investigating the response of varieties to different environmental conditions. The cereals were spring barley, oats, spring and winter wheat and winter rye. Heine's Haisa and Heine's Haha showed the highest resistance to lodging of all the spring barleys tested, being about 5% better than Ackermann's Isaria. The yields for oats are based on war-time results and take no account of later breeding improvements. Of the spring wheats, Lichti's Weihenstephaner gave the highest yield, the next best varieties being Huron and Janetzki's Jabo.

The American spring wheat Regent, though it gave excellent yields in two trials, is not recommended as it undergoes marked degeneration. The yields from the new black stem rust resistant winter wheats Dr Lassers Dickkopf [Dr Lasser's Squarehead] and Admonter Frühweizen [Admont Early wheat] far surpassed Plantahofer, but whether the reliability, as regards yield, of the first two is superior to that of Plantahofer is not yet known. The early Loosdorf Austro-Bankut wheat also showed a high yield. Of the ryes, Kefermarkter gave the highest yield, followed by Oberkärntner and Tyrnauer.

2508. Veiledning i valg av sorter og stammer av korn og rotvekster for Østlandet. **(Guide in the choice of varieties and strains of cereals and root crops for Østlandet).**
 Samvirke, Med. Felleskjøpet, Oslo 1951 : 46 : 86-91.
 Strand, E. *Valg av kornslag. (Choice of cereals).* (pp. 86-90).
 Nissen, Ø. *Noen råd ved kjøp av rotvekstfrø. (Some advice in the purchasing of root crops seed).* (pp. 90-91).

Suitable varieties or strains of barley, oats, spring wheat, peas, turnips, swedes and beets for cultivation in Norway are discussed. Nearly all are of Danish and Swedish origin and known to readers of *Plant Breeding Abstracts*, but one new Norwegian spring wheat, Trym, bred at the Møystad Experimental station, is mentioned as equalling Ås II and Diamant II [Diamond II] in yield in the Oppland region, and as very promising in Sør-Østlandet where it has undergone some trials (cf. Abst. 2522).

2509. VESTERGAARD, E.
 Abed Planteavlsstation. **(Abed Plant Breeding Station).**
 Beretn. Planteavl. Lolland-Falster 1949 (1950) : 5-13.

Wheat

Varieties undergoing trials included: Skandia III, Hansa, Eroica, Pajbjerg Konge II [King II], Jubilé and Trifolium 37-1167.

In the breeding plots some lines of Eroica x Joncquois were noted for their yield and short straw.

Mildew-free material of spring x winter wheat was sown in line cultures.

Oats

A detailed report has been issued by the National Research Authority for Plant Production, recording the performance of Swedish and Danish varieties during 1945-48 at the Abed Station and other Danish stations and centres on different types of soils (cf. Abst. 995). Varietal differences were not very marked, but Pajbjerg Rex (Mansholt Binder x Örn [Eagle]) seems superior to Opus II.

Abed 2-11, from a cross of Fold and Minor, has stiff straw and did well, but not so well as previously. Abed 206, from a cross between Örn and Minor, gave the highest yield on low-lying moor and elite seed will be raised. It is to be put on the market under the name Palu as an indication of its suitability for fen and moor.

Preliminary breeding operations are in progress and the study of some lines of Højer 10 x Minor and Minor x Abed 30 will be continued in 1950.

Barley

In the national trials the varieties Abed Major, Pajbjerg Drot [Pajbjerg King], Ymer, Heimdal, Herta, Plougstrup 544, Øtofte Fero, Nordgaard Carlsberg and Afsa took part. The results are stated not to be available for publication, but the report on barley trials at nine experiment stations during 1943-48 (cf. Abst. 1039) is cited.

2510. TOBJÁŠEK, F.
Do plánu jen správné odrůdy ozimých obilovin. (**For suitable varieties only of winter cereals in the plan**).
Zem. Pokrok 1950 : 17 : 134-36.

Sixteen winter wheats, two spring wheats and twelve varieties of rye cultivated in Czechoslovakia are briefly described.

2511. OSWALT, R. M. and
SCHLEHUBER, A. M.
Oklahoma state-wide variety tests of wheat, oats, and barley; 1947-1950.
Bull. Okla. Agric. Exp. Sta. 1951 : No. B-366 : Pp. 25.

Data are given on the performance of varieties of hard red winter wheat, soft red winter wheat, winter oats and winter barley which were tested extensively in Oklahoma during the years 1947 to 1950. Varietal recommendations are made.

2512. HORNE, F. R.
Cereal varieties. Report on Joint Conference between the National Agricultural Advisory Service, the Seed Trade Association and the National Association of Corn and Agricultural Merchants held at Nottingham, 16th November, 1950.
Minist. Agric. Fish., NAAS, E. Mid. Prov. 1951 : 7-11. (Mimeographed).

Attention is drawn to the expansion of cereal testing in Britain as a result of the cooperation of the National Agricultural Advisory Service: over 3000 yield plots have now been established in addition to those at the substations of the National Institute of Agricultural Botany. The performance of varieties of English, Swedish, Dutch and French winter wheat, spring wheat, oats and barley is discussed. Mention is made of a red wheat similar in most respects to Holdfast but highly resistant to sprouting, which has been developed at the Cambridge Plant Breeding Institute. Crosses between Scandinavian and English malting barleys are also being studied at Cambridge. Two promising selections have been obtained from a cross between Kenia and Spratt Archer: one with straw about 6 inches shorter than that of Spratt Archer, and the other with the desirable characters of Kenia but better malting quality. A cross between Kenia and Plumage Archer has given a family which has outyielded Kenia by 10% and which has higher malting quality.

2513. PFEIFFER, R.
Ergebnisse der Admonter Getreidesortenversuche für das österreichische Zuchtbuch im Anbaujahr 1949/50. (**Results of the Admont cereal variety trials for the Austrian Breeding Register in the 1949/50 season**).
VersErgebn. Bundesanst. alp. Landw. Admont 1951 : No. 9 : Pp. 22.

The varieties of cereals tested comprised 8 winter barleys, 16 winter ryes, 23 winter wheats,

13 spring wheats, 13 spring barleys and 13 oat varieties. Results showing the 1000 corn weights, hectolitre weights, yields, resistance to disease, incidence of winter killing, and crude protein contents are tabulated.

It was noted that the first multiplication of the alpine winter rye varieties Oberkärntner and Lungauer gave yields at least equal to that of their original seed, whereas the yields of the first multiplication of the varieties Schlägler and Kefermarkter, which did not come from alpine districts, were markedly lower than those of the original seed material.

The suitability of trials at Admont for testing winter hardiness, resistance to pressure of snow, to lodging and to various diseases was confirmed.

WHEAT

2514. KIHARA, H.

(**X-ray induced complex mutations in *Triticum monococcum***).

Jap. J. Genet. 1943 : 19 : 136-38. [Japanese].

Mutants comprising combinations of characters affecting morphology, maturation period and depth of chlorophyll pigmentation have been induced in *T. monococcum* by X-irradiation. Details are given of the number of grains obtained and segregation behaviour of two subsequent generations of a mutant characterized by a tubular first leaf and short awns and of an early maturing mutant.

2515. MALIANI, C.

Il San Pastore Strampelli. (**The Strampelli wheat San Pastore**).

Agric. Venez. 1950 : 4 : 242-45.

The breeding, selection and purification of the Italian wheat San Pastore, produced by the late N. Strampelli and formerly called Bruno, are described, with notes on its special merits which include: cold resistance, marked tillering capacity, a well developed root system, and consequently lower nutritive requirements than the variety Damiano.

2516.

Nuove varietà di grano. (**New varieties of wheat**).

Agric. Venez. 1950 : 4 : 293-94.

The following new wheats are being grown on a limited scale by the Bologna Seed Producers: (1) 0.9, derived from Norin 2 x Ciro Menotti, a high yielding medium early hardy wheat of average height, resistant to cold and rust, but not very resistant to lodging; (2) the early, awned variety 0.14, from Damiano x Mentana, resistant to cold and rust and more productive and resistant to lodging than Mentana which it resembles in other respects; and (3) R.12, derived from Allevamento 137/1 x S. Giorgio and of interest only to growers of S. Giorgio, which it resembles; it averaged 45-50 q. per ha. on many farms.

2517.

Florau s.g. (**Florau s.g.**).

Agric. Venez. 1950 : 4 : p. 294.

This is an awnless, soft, winter wheat selection from the Catania Experimental Station for Wheat Cultivation. It is very productive, and has yellowish, ovoid, glutinous grain and is very resistant to lodging, drought, rusts and excessive humidity of the soil in winter. It is suitable for plains and hilly country, and combines good yield with excellent baking qualities.

2518. HOLMGREN, O.

Kalmarfilialens utveckling och några aktuella arbetsuppgifter vid densamma. (**The development of the Kalmar Branch Station and some immediate tasks there**).

Sverig. Utsädesfören. Tidskr. 1951 : 61 : 53-58.

For each of the following crops a short account is given of past and present trends in the work of this branch station of the Swedish Seed Association in breeding varieties suitable

to the Kalmar region: winter wheat, rye and barley; oats; spring wheat and barley; and red clover (cf. Abst. 2427).

2519. ÅKERMAN, Å.
Fünfzig Jahre Weizenzüchtung in Schweden. Methoden und Erfolge.
(**Fifty years of wheat breeding in Sweden. Methods and achievements**).
Z. Pflanzenz. 1951 : 29 : 346-65.

A detailed review is given of winter and spring wheat selection and breeding from 1886, when plant breeding was first started at Svalöf, up to 1943. The aims have included increased yield, winter hardiness, earliness, regional adaptation, baking quality, and resistance to diseases, pests, germination in the ear and lodging.

The writer, whilst recognizing the role of systematic Mendelian breeding, points out that no increases in yield can be expected from the old Swedish land wheats, the genotype of which has remained unchanged for the last 60 years, so that they cannot make use of any increased supply of nutrients or other aids to improved production.

2520. PAL, B. P.
New wheats for old.
Indian Fmg 1951 : 1(N.S.) : 12-13, 22-23, 27.

A popular account is given of the principles of wheat breeding. Results achieved in the past by the Indian Agricultural Research Institute are outlined.

2521. AHLAWAT, M. R.
Punjab.
Indian Fmg 1950 : 11 : p. 304.

It is mentioned that the new hybrid wheat C-224, developed at Lyallpur, has outyielded local varieties in trials at altitudes ranging from 4000 to 6000 ft. above sea level in the Kulu valley of the Kangra district.

2522. BJAANES, M.
Trym, en ny vårkveitesort fra Møystad forsøksgard. (**Trym, a new spring wheat variety from Møystad Experimental Farm**).
Samvirke, Med. Felleskjøpet, Oslo 1951 : 46 : 92-93.

This new variety, bred in Norway from a cross of Fylgia and the Canadian wheat Huron and about to be put on the market, was tested in the Hedemark and Oppland districts. It has a reddish brown, large and well filled ear, the grain being a highly characteristic yellow and also large, with a 1000 corn weight of 39.6 gm. as compared with 35.6 and 31.1 for Diamant II [Diamond II] and Fram II respectively. Trym ripens two days later than Fram II and two days earlier than Diamant II and also utilizes good conditions for growth better than either of the other varieties.

2523. FAJERSSON, F.
Weibulls Original Pondusvårmete. (**Weibull's Pondus spring wheat**).
Agri. Hortique Genetica, Landskrona 1950 : 8 : 119-52.

Full details are given of the performance and main characteristics, e.g. straw strength, earliness, 1000 corn weight, protein content, baking quality, disease resistance and nitrogen requirements of the variety Pondus, bred by the late S. O. Berg and put on the Swedish market in spring 1950 (cf. Abst. 1731).

2524. MEDVEDEVA, G. B.
(**The biology of branching ear development in wheat**).
Trudy Inst. Genetiki (Proc. Inst. Genetics) 1950 : No. 17 : 192-96.
[Russian].

In the experiments conducted at the Institute of Genetics of the USSR Academy of Sciences wheat plants with branching ears were obtained as a result of directed training of several F_1 hybrids from crosses between 28 chromosome wheats having nonbranching ears. The method consisted of increasing the supply of nutrients and restricting illumination to ten hour photoperiods, the treatment beginning twenty-four hours after the emergence of the shoots. The following crosses gave branching wheats: *Triticum dicoccum* var. *farrum* x *T. durum* var. *melanopus*, *T. durum* var. *melanopus* x *T. turgidum* var. *lusitanicum*, *T. dicoccum* var. *farrum* x *T. turgidum* var. *dinurum*, *T. persicum* var. *fuliginosum* x *T. turgidum* var. *dinurum*, *T. turgidum* var. *rubroatrum* x *T. persicum* var. *rubiginosum*, and *T. dicoccoides* var. *pseudojordanicum* x *T. turgidum* var. *speciosum*.

2525. LEIN, A.
Bemerkungen zu der Arbeit von O. H. Frankel: A polymeric multiple gene change in hexaploid wheat. (**Observations on the work of O. H. Frankel: "A polymeric multiple gene change in hexaploid wheat"**).
Heredity 1951 : 5 : 147-49.

Reference is made to the trifactorial chlorophyll defect in hexaploid wheat reported by Frankel (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1528) and explained by him as a multiple mutation. The present author points out that Frankel's results can be explained by a single mutation or deletion of a gene *X*, epistatic to the other alleles governing chlorophyll formation. The data published by Frankel are not sufficient to decide between the two explanations but the fact that the chlorophyll defect was found together with a deletion is regarded as significant.

2526. MEDVEDEVA, G. B.
(**The effect of agricultural methods upon the development of forms in the F_1 of wheat hybrids**).
Trudy Inst. Genetiki (Proc. Inst. Genetics) 1950 : No. 17 : 197-217.
[Russian].

The results of directed training upon several F_1 hybrids obtained by wide crossing are reported. The purpose of the experiments was to direct changes in dominant and recessive characters by varied environment. The external conditions differed regarding the dates of sowing, supply of nutrients and the length of illumination during the different phases of growth.

The data obtained in analyses of the colour, shape, pubescence and awn characters of the ear, several quantitative properties affecting yields and some growth characters disagreed with those expected on the basis of accepted genetical principles determining dominant and recessive characters in wheat hybrids. The list of genes responsible for dominance and recessiveness compiled by T. K. Lepin and O. K. Fortunatova is referred to in this connexion (cf. *Plant Breeding Abstracts*, Vol. VI, p. 327). Changes obtained in the dominance of separate characters in the hybrids were of three distinct types: some hybrids did not reproduce either the male or the female parental type, others resembled one of their parental forms, and, lastly, some hybrids developed new properties when grown under one set of conditions, but not under others.

2527. MATSUMURA, S. and
MOTIZUKI [MOCHIZUKI], A.
(**Linkage studies in common wheat**).
Jap. J. Genet. 1943 : 19 : 104-06. [Japanese].

A study of the cross *Triticum vulgare* var. *erythrosperrum* x *T. Spelta* var. *Duhamelianum* has provided the following linkage data. Genes *S* (speltoid), *N* (awnless), *Hf* (hairy leaf)

and *Hn* (hairy node) are linked in that order, the respective cross-over values between consecutive genes being estimated as 32.7, 15 and 2%.

2528. LAZUR, G. L.

(Mičurinite science at the breeding and agricultural research stations in the Kazah SSR).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 8 : 27-34. [Russian].

Plant breeding in Kazakhstan, with notes on new varieties of wheat bred at institutes whose programmes conform with the Mičurinite principles, is surveyed briefly.

At the Alma-Ata Breeding Station several new wheats showing resistance to lodging and fungous diseases, including a new spring wheat derived from the winter type Ukrainka [Ukrainian], were obtained. The new variety yields 1-2 c. more per ha. than the standards. Breeding work with Bes-bas-bidaï [Five Headed wheat] found in the Kounrad district, Karaganda province, is reported. The methods consist of hybridization, selection and training, the aim being to obtain a wheat with 100% branching ears. During experiments with individual grains from a single ear of Bes-bas-bidaï, plants of different botanical varieties were obtained.

At the Šortanda Research Station extensive use of heterozygous material has given good results. The hardy and high yielding variety Akmolinka, which was developed at the institute, had 12 different forms of wheat in its parentage. Akmolinka 1 is now being superseded by Šortandinka [Šortanda] which yields 2 c. more per ha. Other new promising wheats bred at Šortanda are Sneguročka [Snow Princess], Borjba [Struggle] and the hard wheats Akmolinka 2 and Akmolinka 5. Breeding work with Bes-bas-bidaï, which is being crossed with Akmolinka, Šortandinka and hard wheats, is reported.

Mičurinite breeding methods used at the Krasnovodopadskaja Breeding Station include training wheats for branching ear. Bes-bas-bidaï cultivated upon good soil gave 46% and Ak-bidaï [White wheat], from which Bes-bas-bidaï was originally selected, 34% branching ears.

2529. ŽEBRAK, A. R.

(An experimentally produced species of wheat, *Triticum compactum*).

Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1949 : 68 : 393-96. [Russian].

The cross, which gave *T. compactum* in the F_1 plants, involved an amphidiploid, designated *T. soveticum* subsp. *turgidum*, and *T. vulgare*. The amphidiploid was derived from *T. turgidum* x *T. Timopheevi* and had $2n = 56$.

The plants obtained in the F_4 had $2n = 49$ and remained constant in their progenies in respect of the characters of *T. compactum*. Descriptions are given of the forms obtained. Because of their remarkably compact ears they are regarded as valuable material in breeding. Most *compactum* wheats occurring in the USSR are spring races, but the new forms have a winter habit and in this respect resemble some Afghan wheats.

2530. ELLIOTT, F. C.

A stiffhair wheatgrass—Pentad durum gene source for common wheat.

Agron. J. 1951 : 43 : 131-36.

Pollen meiosis was studied in F_4 plants of line 174 which was derived from the cross *Agropyron trichophorum* x Pentad (*T. durum*), in Marfed (*T. vulgare*), and the F_1 and F_2 generations of the cross between Marfed and F_4 line 174. The derivatives of line 174 ($2n = 56$) showed considerable cytological irregularity, although their appearance in the field was uniform. Meiosis in Marfed was normal. The F_1 hybrids had a chromosome number of $2n = 49$. They were somewhat intermediate in morphological characters

between the parents. The average number of bivalents was 14.5; the number of univalents per cell ranged from 7 to 13; multivalent associations were observed which involved as many as 10 chromosomes. Under greenhouse conditions the F_1 hybrids had an average seed set of 62%. Chromosome numbers in the F_2 varied from $2n = 42$ to 51. Pairing was fairly normal, but extreme ranges in chromosome associations were noted. Fertility in the F_2 appeared to have no relationship with chromosome number or any other cytological feature. Frequency of univalents usually increased with increasing chromosome number. No correlation was found between morphological characters and chromosome number or fertility. Under field conditions, seed set in the F_2 ranged from 1.1 to 97%. On the basis of the fertility and recombination of morphological features observed in the F_2 , it is believed that certain lines in later generations may be valuable as parents for introducing new gene complexes to *T. vulgare*.

2531. NAMEK, M. and
MOMTAZ EL-GINDY, M.
Minerals in Egyptian cereals: a study of the effect of variety and environment on: pH, ash, calcium, magnesium, potassium, and phosphorus in wheat and maize.
Trans. Amer. Ass. Cereal Chem. 1951 : 9 : 13-16.

An analysis of differences in pH, mineral composition and dry matter content of 8 wheat varieties and 5 forms of maize, selected for cultivation in Egypt, has been completed. Varietal differences were found in the 1947 crops grown in one area but the influence of the environment, observed by growing each variety at 20 scattered localities in 1948, produced greater divergence in the characteristics estimated.

2532. UCHIKAWA, I.
Genetic and cytological studies of speltoid wheat. III. Origin of compactoid wheat.
Mem. Coll. Agric. Kyoto 1942 : No. 52 : Pp. 49.

Detailed descriptions are given of the morphology and cytology of compactoid wheats, comprising the genotypes I and II, and their homozygous and heterozygous forms. The segregation ratios from the different compactoids are recorded. It appears that type I heterozygous compactoid ($2n = 43$) originated by duplication of a whole C chromosome bearing the compactoid determinant; the homozygous form ($2n = 44$) has a pair of duplicated C chromosomes. Abnormalities in the segregation ratios of type I heterozygous compactoids are attributed to the unbalanced chromosome numbers of gametes, compared with those derived from the normal wheats ($2n = 42$).

Heterozygous type II compactoids have a chromosome complement of 42, including a heteromorphic pair; one member of the pair resembles the C chromosome of speltoid wheats, while the other is larger and has been designated as C'. The type II homozygous compactoid carries either a large chromosome pair (C'C') or two large univalents (C' + C'). The results of reciprocal crosses between type II heterozygous compactoid x normal and type II heterozygous compactoid x type II homozygous compactoid indicate that the inheritance of the compactoid character, in individuals with 42 chromosomes, is dependent on the presence of the C' chromosome. It is considered that C' is equivalent to a whole C chromosome plus the long arm S_2 fragment (cf. Abst. 222) of the C chromosome.

2533. *ERMOLENKO, A. P.
(**Surhak Jubileinyĭ**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :
50-51. [Russian].

A productive alternative wheat, Surhak Jubileinyĭ [Jubilee Surhak] has been developed at the Tadžik State Breeding Station from an improved local variety Surhak 5688. The

* An extended summary of this paper is on file at the Bureau.

breeding methods consisted of selection and training for earliness by planting the wheat for several years in April. The new variety, when sown in winter, is early and has good quality grain, its 1000 grain weight being 56 gm. It shows resistance to lodging and lacks the drooping ear of Surhak 5688. Its straw is 14.4 cm. shorter than the straw of the initial variety and has 5 instead of 6 internodes. When sown in the spring, Surhak Jubileinyi is as early as the Safedak wheats and earlier than Irody 1006. Its straw and ears are shorter than those of the variety when planted in winter. The 1000 grain weight is 46 gm.

2534. TONGIORGI, E.

Grano, miglio e fave in un focolare rituale dell'età del bronzo a Grotta Misa (bassa valle della Fiora). [**Wheat, millet and beans in a ritual hearth of the bronze age at Grotta Misa (lower valley of the Fiora)**].

Nuovo G. Bot. Ital. 1947 : 54 : 804-06.

The finds include *Vicia Faba* var. *equina*, a new form of bread wheat, *Triticum vulgare* f. *Specus-Misae*, and *Panicum miliaceum*.

2535. SERMONTI, G.

Osservazioni sulla meiosi di un ibrido pentaploide di frumento. (**Observations on the meiosis of a pentaploid hybrid of wheat**).

Ann. Sper. Agrar., Roma 1950 : 4 : 931-40.

A study of meiosis in the pollen mother cells of an F_1 hybrid of *Triticum vulgare* x *T. dicoccum* has confirmed the existence of the homology already observed by previous investigators between 14 pairs of chromosomes in crosses between hexaploid and tetraploid wheats. At the same time, there seems to be a marked decrease in the original affinity between the chromosomes of the tetraploid and the corresponding 14 chromosomes of the hexaploid; and this applies particularly to four pairs of chromosomes which generally form telosyndetic bivalents, but sometimes remain unpaired or form polyvalents. These and other anomalies affecting the equatorial division of the univalents at division I, the random segregation of their derivatives at division II, and ultimately the inheritance of characters in the hybrid, support the suggestion that the degree of homology between the chromosomes has diminished.

2536. SERMONTI, G.

Osservazioni citologiche su ibridi di *Aegilops ovata* L. x *Triticum vulgare* Host. e *Tr. dicoccum* Schülb. (**Cytological observations on hybrids of *Ae. ovata* L. x *T. vulgare* Host. and *T. dicoccum* Schülb.**).

Ann. Sper. Agrar., Roma 1950 : 4 : 941-51.

The existing morphological and cytogenetical evidence on chromosome affinity in *Aegilops* and *Triticum* is reviewed and the author records his observations on bivalent formation in crosses made by him, namely *T. vulgare* (Damiano) x *Ae. ovata* and *T. dicoccum* (Emmer) x *Ae. ovata*. From the greater affinity between the chromosomes in the *T. vulgare* (ABC) x *Ae. ovata* cross the author infers the existence of partial homology of the chromosomes of *Ae. ovata* with the C genome of the hexaploid wheat. The interpretation of the nature of the affinity noted in the hybrid *T. dicoccum* x *Ae. ovata* remains a problem and no actual genetic affinity between the two parent species can be assumed without more evidence.

2537. MATSUMURA, S. and

NAKAMURA, Y.

(**An example of a partially sterile homozygous wheat with a translocation**).

Jap. J. Genet. 1943 : 19 : 1-7. [Japanese].

A 29-chromosome plant was obtained in the F_2 of the cross *Triticum polonicum* x *T. Spelta*. On selfing, two types of plant were obtained in a 1 : 1 ratio, namely, individuals with

$2n = 1_{IV}$ and 12_{II} and $2n = 14_{II}$ respectively. A partially sterile dwarf type with $2n = 12_{II}$ segregated from the progeny of the former category. On crossing the dwarf with *T. polonicum*, fertile plants of normal height with $2n = 1_{IV} + 12_{II}$ chromosomes were obtained. On selfing the last-mentioned hybrid, plants with $2n = 14_{II}$ and $2n = 1_{IV} + 12_{II}$ were obtained in a 1 : 1 ratio. On crossing the dwarf type with *T. Spelta*, the progeny consisted mainly of partially sterile plants with the configuration $2n = 1_{IV} + 12_{II} + 7_I$. These results are interpreted as evidence that the dwarf hybrid is homozygous in respect of a translocation.

2538. SÁNCHEZ-MONGE, E.
The stability of isochromosomes.
 An. Estac. Exp. Aula Dei 1951 : 2 : 168-73.

A comparison was made between the frequencies of lagging and misdivision of the normal chromosome C and the isochromosome Cil during meiosis of subcompactoid wheat. The isochromosome was found to possess a centromere of normal strength and behaviour; its instability is therefore due to its being a univalent rather than to its isochromosomal condition. The following suggestions are made concerning the origin of telocentrics. Unstable telocentrics are produced by misdivision of the centromere (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2232); stable telocentrics can, however, also undergo misdivision and thus give rise to unstable telocentrics. Unstable telocentrics can be transformed into isochromosomes by secondary misdivision.

2539. CHINOY, J. J. and
 NANDA, K. K.
Effect of vernalization and photoperiodic treatments on growth and development of crop plants. I. Varietal differences in flowering of wheat and its correlation with length of spike under varying photoinductive and post-photoinductive treatments.
 Physiol. Plantarum, Copenhagen 1951 : 4 : 209-23.

Germinating seeds of the *Triticum vulgare* varieties NP 165, NP 52 and PC 591 were subjected to different photoperiodic treatments. Upon the completion of these treatments, the seedlings were exposed to short, normal and long day illumination. Observations on the effects of these so-called photoinductive and postphotoinductive treatments upon time of flowering and upon the correlation between time of flowering and spike growth are reported; varietal differences in response to the treatments are noted.

2540. FORLANI, R.
 Sperimentazione sulla allogamia del frumento. (**Experiments on allogamy in wheat**).
 Genetica Agraria, Roma 1950 : 2 : 233-46.

Experiments have shown that some degree of cross fertilization of wheat can be induced under the climatic conditions of Italy and in Italian wheats by the practice advocated by Russian investigators. The method, which consists in removing the top of the florets of each spikelet, obviates any need for emasculation. The set of hybrid seed varied considerably with the varieties used and was possibly also affected by weather conditions. Evidence was also obtained in favour of Lysenko's theory of selective fertilization.

2541. GIACANELLI, E.
 Ricerche sul contenuto in catalasi de varie razze di frumento. Nota II.
(Researches on the content of catalase of various wheat varieties. Note II).
 Ann. Sper. Agrar., Roma 1951 : 5 : 499-516.

Five varieties of wheat from three different localities in Italy were studied to determine the effect of heredity and environment on the catalase content of the grain.

Statistical analysis of the results of 3780 determinations suggests that though catalase content is probably controlled by hereditary factors, the environment in a particular locality affects the actual amount of catalase present in the grain under the climatic conditions in Italy.

No correlation was found between catalase content and the bread making quality of the flour.

2542. SUETSUGU, I.

(Developmental morphology of the embryo in wheat varieties).

J. Nishigahara Imp. Agric. Exp. Sta. 1950 : 4 : 91-104. [Japanese].

A detailed comparison was made between the course of embryonic differentiation and development in 10 Japanese wheat varieties. In general, in varieties requiring a longer period for afterripening, the upper part of the hypocotyl is shorter than the lower part.

2543. KIHARA, H.

(A linkage group in the einkorn wheats).

Jap. J. Genet. 1944 : 20 : 64-67. [Japanese].

The F_1 hybrid of *Triticum aegilopoides* var. *boeoticum* x *T. monococcum* var. *vulgare* resembles the former species in most respects. Cross-over values have been calculated for the genes *sca*₁ (glabrous lamina), *gla*₁ (hairy rachis) and *his* (hairy node), namely: *his-sca*₁, 3.9; *sca*₁-*gla*₁, 6.0; and *his-gla*₁, 11.3.

2544. WAHNON, J. S.

Palhas de cereais (trigo, cevada e aveia). Composição e valor alimentar. [Cereal straws (wheat, barley and oats). Composition and nutritive value].

Melhoramento, Elvas 1950 : 3 : 31-75.

Analyses have been made of the percentage of water, and contents of dry matter, ash, protein, fat, digestible and non-digestible cellulose, pentosans, lignin, phosphorus, calcium and iron of Portuguese varieties of *Triticum turgidum*, *T. vulgare*, *T. durum*, barley, *Avena sativa* and *A. byzantina*.

2545. MIKAYE, M. and

SUETSUGU, I.

(Results of studies on the characteristics and baking quality of cultivated wheat varieties from warm regions).

J. Nishigahara Imp. Agric. Exp. Sta. 1950 : 4 : 77-90. [Japanese].

Data are presented on the vegetative cycle, grain composition and weight, absorption capacity of the flour, loaf volume, and appearance and texture of the loaf of some 150 Japanese, Manchurian, Formosan and other wheat varieties grown at Kyushu.

2546. DURHAM, R. K.

Properties of flours milled from selected wheat varieties.

Trans. Amer. Ass. Cereal Chem. 1951 : 9 : 39-48.

Flour ground from each of 13 varieties representing white, soft red winter, hard red winter, hard spring and red durum wheats has been analysed by the US Department of Agriculture with respect to its protein quality, ash content, granulation, surface area, mixing quality, extensograph value, amylase activity, viscosity, sedimentation value and baking characteristics; wide differences were observed between the varieties in all characters.

2547. ELLING, H. R. and
MILNER, M.

Influence of wheat variety, malt, and shortening on the characteristics of chemically leavened biscuits.

Cereal Chem. 1951 : 28 : 207-18.

The biscuit making quality of flours milled from a number of hard and soft wheat varieties has been estimated at the Kansas Agricultural Experiment Station; differences influenced by varietal characteristics are listed. Optimum shortening content was only significantly correlated with flour viscosity and protein content in hard wheats.

2548. URZUA, A. H.

Estudio de la composición química de los trigos Chilenos en relación a la variedad y al año de cosecha. (Study of the chemical composition of Chilean wheats in relation to the variety and the year of harvest).

Agríc. Téc., Chile 1949 : 9 : 11-27.

Data are provided on the grain weight, percentage moisture, and ash, calcium, phosphorus, iron, fat, nitrogen, carbohydrate, thiamin, riboflavin and niacin contents of 18 wheat varieties grown in Chile. Varietal differences were noted for all substances except iron.

2549. ÅKERMAN, Å.

Fortsatta undersökningar rörande råproteinhalt och bakningsförmåga hos Svalöfs Odinvete. (Further investigations regarding the crude protein content and baking quality of the Svalöf wheat Odin).

Sverig. Utsädesfören. Tidskr. 1951 : 61 : 50-52.

Continued experiments (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 209) show that, while the hardy and high yielding wheat Odin contains less crude protein than its parents Ergo and Gluten, it has inherited the high quality of the protein of Gluten and gives a larger loaf volume than Ergo.

- 2550.

Twenty-Fourth Annual Report of the Board of Grain Commissioners, Grain Research Laboratory Winnipeg, Manitoba 1950 (1951) : Pp. 92.

In Part I factors determining macaroni quality in durum wheats are examined and laboratory methods of estimating quality which are used in breeding are described.

Investigations reported in Part II include tests of the quality of Australian wheats grown in Canada and a study of the effect of irrigation upon the quality of durum varieties. Some of the Australian varieties exhibited qualities resembling those of good Canadian wheats; Gabo and Gular have given particularly good results as regards quality, yielding capacity, earliness and leaf rust resistance.

Part III deals chiefly with the results of tests on varieties submitted by plant breeders. In 1949, the annual routine tests on hard red spring wheat comprised 25 varieties; Lee (Hope x Timstein) was recommended for licensing and distribution in Canada (cf. Abst. 979). A collaborative study by British, United States and Canadian investigators was carried out on Red Thatcher, Lee and CT 609 (Mida x Cadet), with Marquis and Thatcher as standards. Varieties of bread wheat grown at stations in the north of the United States were tested. Sixteen varieties of amber durum wheat grown by breeders in Canada were studied for macaroni quality. Of the new Canadian hybrids, DT 117 (1742 x Carleton) appeared to be promising. Two of the hybrid selections from the United States, Ld. 303 and 308, gave better results than Carleton.

The results of tests on 21 varieties of malting barley are summarized. Montcalm, now widely grown in western Canada, continues to show very favourable properties (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 530); it is lower than the standard OAC 21 in barley nitrogen and higher in yield of malt extract and in saccharifying activity. Among the

Canadian hybrids analysed, U of A 44-1, Brandon 933, Brandon 1341, U of M 856 and U of M 43-1020 are to be further tested. The varieties from the United States were low in all malt properties and could not be classed as malting barleys; Moore, approved as a malting variety in the USA, was the best of the six samples studied but was definitely inferior to OAC 21.

2551. HITRINSKIĬ, V. F.

(Improvement of the yielding capacity of the seed of spring wheat).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 10 : 5-9. [Russian].

The heritable properties of several spring wheats were improved at the USSR Institute of Breeding and Genetics by planting the wheats for one season in late autumn instead of in the spring. Appreciable increases in the yielding capacity and 1000 grain weights were thus obtained in *Lutescens* 1163, *Odesskaja* 13 [Odessa 13], *Ukrainka Jarovaja* [Spring Ukrainian] and a *Triticum turgidum* variety *Vetvistaja* [Branching]. Changes in the growth habit and some morphological characters of *Lutescens* 1163, *Odesskaja* 13 and *Melanopus* 69 resulting from late autumn planting are described. The treatment controlled loose smut, but not bunt.

2552. SÁNCHEZ-MONGE, E. and

VILLENA, L. M.

Variedades de barba lisa entre los trigos Españoles. **(Smooth-awned varieties among the Spanish wheats).**

An. Estac. Exp. Aula Dei 1951 : 2 : p. 210.

Smooth-awned forms of *Triticum durum* classified under the botanical varieties *fere-leucomelan*, *fere-apulicum*, *fere-melanopus*, *fere-italicum* and *fere-erythromelan* are reported from among the Spanish varieties of the species.

2553. BELIZ, J. M.

Sistemática de trigos. II. Classificação e descrição botânica de algumas formas cultivadas Portuguesas. **(Systematics of wheat. II. Classification and botanical description of some cultivated Portuguese forms).**

Agron. Lusitana 1949 : 11 : 141-60.

Full botanical descriptions are given of the varieties *Gentil* [Noble], *Da Piedade*, *Centeio* [Rye], *Elvense*, *Magueija de colmo cheio* [Solid-stemmed Magueija], *Ribatejano*, *Sado*, *Transmontano*, *Pirana*, *Barbado*, *Beirão*, *Luso* [Portuguese] 2740 and 3478, and *De S. Vicente* of *Triticum vulgare*, *Arouca* of *T. turgidum*, and *Guadiana* of *T. durum*.

2554. BELIZ, J. M.

Sistemática de trigos. III. Classificação e descrição botânica de algumas formas cultivadas em Portugal. **(Systematics of wheat. III. Classification and botanical description of some forms cultivated in Portugal).**

Melhoramento, Elvas 1950 : 3 : 76-92.

Full botanical descriptions and photographs are given of the Portuguese varieties *Bejense*, *Bárbaro*, *Galego miúdo* [Little Galician] and *Preto de Tavira* [Black Tavira], and the introduced varieties *Roma*, *Quaderna*, *Oberdan*, *Hedba* and *Cappelli*.

2555. ŽUKOVSKIĬ, P. M.
(**The systematics of the wheat species and a new species of wheat**).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1949 : 69 : 261-63.
[Russian].

The systematic classification of wheats is revised so as to include the most recent Soviet research. A Latin description of a new species, *Triticum amplissifolium*, is given.

2556. CLARK, J. A. and
BAYLES, B. B.
(**Distribution of the varieties and classes of wheat in the United States in 1949**).
Circ. U.S. Dep. Agric. 1951 : No. 861 : Pp. 71.

Wheat varietal surveys have been made by the US Department of Agriculture since 1919 at five-yearly intervals. The present circular reports the results of the seventh survey, carried out in 1949. The methods used in making the survey are outlined. Tables provide information on the estimated acreages of varieties and classes of wheat in the whole of the United States and in each different state, for 1949 and previous years of the survey. Varietal descriptions are included.

2557. GEROEV, M. JA.
(**Winter wheat in the northeastern zone of Baškiria**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :
45-49. [Russian].

Varietal trials with winter wheat in Baškiria are reported. In 1949, Šmitovka 276, a hardy variety developed at the Petrovskaja State Breeding Station, outyielded the standard Uljjanovka [Uljanov]. Previously, Uljjanovka and Milturum 122 were unsurpassed in yield and showed the highest degree of resistance to cold under Baškirian conditions.

2558. MODENA, A.
Nuove razze di frumenti per la montagna. (**New races of wheat for the mountainside**).
Agricoltura Tosc. 1951 : 6 : 127-30.

In spite of the performance of the new wheats Probus (cf. Abst. 1732), Plantahof, MC 245 (Mont-Calme XXII x Hâtif Inversable [Early Nonlodging]) and MC 268, derived from (Carré Vaudois [Vaud Squarehead] x MC XXII) x Vuiteboef, which were all bred at Swiss research stations and tested in mountain districts, the writer doubts their suitability for the particular requirements in Italy, in the central part of the southern Apennines. For that region and specially for the Apennines in Tuscany, new varieties to replace Est 72 may soon be available from the University of Florence, where Oliva and Gasparini and their collaborators at the Institute for Herbaceous Crops are working on the production of new forms.

In the past year in tests at an altitude of 750 metres and at 1150 metres, the limit for wheat cultivation in the Apennines near Pistoja, the following were exceptionally successful new varieties: Est x Poilu (strains 19/1 I 39 I and 19/1 A 393), Est x 210 (17/3) and Est x Mont-Calme (62/3). In addition some appear to have shown marked frost resistance even better than that of Est 72.

A white, awnless, rust resistant, Russian wheat is also mentioned as possibly suitable for mountainside cultivation owing to its procumbent habit in winter and its late reversion to erect growth in spring. In cold resistance it equals Torrenova.

Other wheats worth testing for mountain cultivation are cited from the literature, e.g. Sossai, now released after 14 years selection, a cold resistant productive wheat, particularly suited to high altitudes; and the Svalöf wheats referred to in Abst. 203.

2559. BONDARENKO, G. K.

(The inheritance of hardiness in crosses of winter wheats).

Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1949 : 67 : 153-55.

[Russian].

The inheritance of resistance to frost of hardy, medium hardy and susceptible varieties of several winter wheats and their F_1 , F_2 and F_3 hybrids was studied at the Ukrainian Scientific Research Institute of Grain Farming. Crosses involving two hardy parents, for instance, Hostianum 237 x Odesskaja 3 [Odessa 3] or one hardy x one medium hardy parent such as the hybrid between Hostianum 237 and Erythrospermum 15, gave the hardest F_1 , F_2 and F_3 hybrids.

2560. FEOFANOVA, N. D.

(Varietal differences between winter cereals during vernalization under conditions of low temperatures).

Dokl. Akad. Nauk. SSSR (Rep. USSR Acad. Sci.) 1949 : 68 : 181-84.

[Russian].

The capacity of winter cereals for completing their vernalization phase at temperatures below -3.8°C , in the case of wheat, and below -6°C , in that of rye, is associated with the hardiness and the geographical origin of the varieties. In the present experiments conducted at the USSR Institute of Plant Industry, Lutescens 329 was the hardest variety of winter wheat, and Čitinskaja [Čita] and Vjatka, the hardest varieties of winter rye. Thule 2 and Kooperatorka [Cooperator], which have both originated under less severe climatic conditions, the former in Sweden and the latter in the Ukraine, have often been incapable of earing after passing the vernalization phase at -3.8°C . Similarly the rye varieties Turkestanskaja [Turkestan] and Taraščanskaja, the latter bred in the Kiev province, have also frequently failed to ear after vernalization at -6°C .

2561. ROZENTRETER, N. A.

(The importance of the root system in wheat breeding).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 10 :

10-15. [Russian].

As a result of experiments at the Gorjgov State Breeding Station with several spring wheats, including the drought-resistant varieties Gorjgovskaja 15 and 13 [Gorjgov 15 and 13], varietal resistance to drought has been associated with the capacity for vigorous development of the roots. A good indication of resistance at an early stage was the development of over five embryonic roots by the plants during the second and third leaf phases. In the trials conducted at the institute under moderate drought conditions a local Čuvaš variety, Alborubrum, headed the list of seven varieties in respect of the number of roots formed at the third leaf phase. It also showed a vigorous development of nodal roots and leaves and a good tillering capacity. The variety is regarded as promising material in breeding.

2562. AZZI, G.

Il "Biancone dell'Elba" e la sua resistenza specifica alla stretta di caldo.

(Biancone dell'Elba and its specific resistance to hot spells).

Riv. Ecol. 1950 : 1 : 231-37.

Biancone dell'Elba is the only wheat, to the author's knowledge, with high resistance to hot spells of short duration, e.g. a few hours. It is also productive and shows some resistance to drought, but it is subject to lodging. It ripens very late and develops slowly. The stem is long and slender, and the ear large and procumbent; the internodes are long, and the very small leaf blades tend to be reduced in size towards the apex of the plant which in the field thus resembles rye.

The reduction in the amount of foliage with the microcellular structure of the leaf blades contributes to the resistance to drought and hot spells, and in addition, the reduction in

foliage towards the apex decreases the area of transpiration, thus preventing damage by heat, without the kernels losing their turgescence or the plant its productivity. Biancone dell'Elba, a very old form, is to be studied systematically and genetically. It is probably an ecotype of *Triticum durum* var. *hordeiforme*, and has become adapted during centuries to a different environment from its original one.

2563. KAWAAL, I.

(Diseases of spring cereals).

Agric. and Hort., Japan 1949 : 24 : 209-16. [Japanese].

Japanese wheat and hulled and naked barleys resistant to the following diseases are listed: *Erysiphe graminis*, *Puccinia glumarum*, *P. triticea*, *P. graminis*, *P. simplex*, *Ophiobolus graminis*, *Corticium gramineum*, *Gibberella Saubinetii* and various nonfungal diseases resulting in aborted grains.

2564. BALDACCI, E. and

FORLANI, R.

Il comportamento delle specie e degli ibridi di *Triticum* alle infezioni di *Claviceps purpurea*. **(The reaction of species and hybrids of *Triticum* to infections with *C. purpurea*).**

Genetica Agraria, Roma 1950 : 2 : 247-57.

Previous work is considered in discussing the results of inoculating the following species and also hybrids between some of them with *C. purpurea*: *T. vulgare*, *T. sphaerococcum*, *T. Spelta*, *T. durum*, *T. dicoccum*, *T. turgidum*, *T. monococcum*, *T. villosum*, *Secale cereale* and *Aegilops ovata*. About 10,000 inoculations were made.

T. vulgare was on the whole as susceptible as rye in the two last years, but marked varietal differences were noted.

In *T. durum* variation was too great to allow of generalization, though in 1949 the one ear infected in 1947 proved immune in 1949. *T. dicoccum* proved immune in 1949 as it had already done in 1947 but gave a positive result in 1948.

T. Spelta was totally immune in 1948 and 1949.

Ae. ovata, which had proved immune in 1947, showed infection in one ear out of seven inoculated in 1949.

Resistance in the hybrids was irregular and no general inference can be drawn.

Sterility was not correlated with resistance.

2565. ŠEVČENKO, F. P.

(Improved resistance to diseases of cereal varieties).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 8 : 35-38. [Russian].

In Siberia, many wheats show intravarietal differences in degree of susceptibility to rusts and type of infection with rusts. Good results have been obtained with a biological method for improving varietal resistance to rusts. The method consists of single, twofold or continuous selection of individuals for well developed grains of good germinating capacity and with heavy specific and 1000 grain weights.

The method proved efficacious with varieties such as Milturum 321 which has been cultivated for many years under conditions of rust infection; with the hybrid varieties Milturum 533 and Caesium 94/14630; with new nonsusceptible varieties such as Lutescens 21, BR-13, Albidum 3700 and Artemovka; and with moderately susceptible heterogeneous varieties like Smena [Change] and Alenjkaja [Little Scarlet]. The resistance to rusts of some varieties was improved by over 20%. The selection method had no effect upon rust resistance of Washington and Kitchener, which are not normally susceptible to the disease. This method of selection is also recommended in breeding for resistance to loose smut, bunt, black mould, and to diseases caused by *Fusarium*, *Septoria* and *Helminthosporium*. Evidence supporting the argument was obtained with wheats and barleys in infection trials with bunt, smut and *Helminthosporium*.

2566. POPP, W.

Infection in seeds and seedlings of wheat and barley in relation to development of loose smut.

Phytopathology 1951 : 41 : 261-75.

The interrelations between the wheat or barley variety, the physiological race of *Ustilago Tritici* or *U. nuda*, the amount of mycelium present in the individual seed embryo and the interaction between host and pathogen at different stages of plant development are discussed, following an investigation of the reactions of numerous varieties of wheat and barley to loose smut in Canada.

2567.

Pennoll, new soft wheat, has milling quality; excels other varieties in 8-year yield tests.

Crops and Soils 1951 : 3 : No. 7 : p. 32.

A new soft red winter wheat, Pennoll, has been developed from Valprize and Nittany at the Pennsylvania State College. Although it matures later than Thorne, the principal variety grown in Pennsylvania, Pennoll has produced higher yields, over a period of eight years. It is resistant to bunt and loose smut, and has shown a satisfactory quality in milling tests.

2568. PICHLER, F.

Über die Anfälligkeit der österreichischen Weizensorten für Weizensteinbrand (*Tilletia tritici*). [The susceptibility of the Austrian wheat varieties to wheat smut (*T. tritici*)].

Bodenkultur, Wien 1951 : 5 : 61-66.

Even after seed treatment, susceptible varieties tend to become more infected than resistant ones and observations have been made for a number of years on the degree of attack of a number of varieties after artificial infection of their seed. No variety was immune or even highly resistant, Austro-Bankut being the most resistant of the winter wheats tested. Spring wheats were all relatively free when sown in spring but varied considerably in resistance when sown in autumn.

2569. GRASSO, V.

La resistenza dei grani duri alle carie (*Tilletia* spp.). [The resistance of durum wheats to bunt (*Tilletia* spp.)].

Ann. Sper. Agrar., Roma 1951 : 5 : 411-18.

The bunt resistance of the *durum* wheats Sen. Cappelli, Russello SG 7, Timilia, Saragolla, Azizia, Dauno and Garigliano was compared with that of the soft wheats Mentana, Solina, Avanzi 8 and Trento by artificial infection of sowings in a number of districts in Italy. The most resistant was Russello SG 7; Sen. Cappelli, Garigliano and Timilia also showed some resistance. Dauno, Saragolla and Azizia were rather susceptible. The soft wheats showed high susceptibility, especially Mentana.

2570. SCHAAL, W.

Kiowa, new winter wheat for Kansas area.

Crops and Soils 1951 : 3 : No. 7 : p. 30.

Kiowa, a new winter wheat developed by the Kansas Agricultural Experiment Station from Chiefkan x Oro-Tenmarq, is well adapted to western Kansas. Although it has a high degree of resistance to stinking smut, it is more susceptible to loose smut than Comanche or Tenmarq. Kiowa has satisfactory milling and baking characteristics and has outyielded Comanche by an average of 1 to 3 bushels per acre.

2571. Koo, K. S. and
AUSEMUS, E. R.
**Inheritance of reaction to stem rust in crosses of Timstein with
Thatcher, Newthatch, and Mida.**
Agron. J. 1951 : 43 : 194-201.

In segregates from the cross Timstein x Thatcher reaction to stem rust under field conditions depended upon two complementary factors, susceptibility being dominant; in segregates from Timstein x Newthatch and Timstein x Mida field reaction to stem rust was controlled by a single factor pair, resistance being dominant. Timstein showed susceptibility under the field conditions of the experiment; therefore it is assumed that field resistance in segregates of these crosses was derived from the other three parents. Random F_3 lines of each cross were tested for their seedling reaction to a single race to which Timstein was resistant and the other parent susceptible; in each cross resistance was conditioned by a single dominant gene, Sr^T , contributed by Timstein. F_4 lines were obtained from selected F_3 lines with known reactions to a single race and tested in the seedling stage for their response to 21 physiological races. The factor pair $Sr^T Sr^T$ from Timstein controlled resistance to 20 races. Thatcher and Newthatch contributed a factor pair for a high degree of resistance to group 1 of the races, which was epistatic and nonallelic to the factor pair of Timstein. The data indicated that the physiological resistance of Timstein could be combined with the mature plant resistance of the other three varieties.

2572. SILVA, A. R. DA.
Estudos preliminares para a produção de variedades de trigo resistentes
às ferrugens no Brasil. (**Preliminary studies for the production of
wheat varieties resistant to rusts in Brazil**).
Bol. Serv. Nac. Pesqu. Agron., Brasil 1947 : No. 1 : Pp. 53.

Seven biotypes of leaf rust have been isolated in Brazil, and studies have been made on four races of stem rust. Tables are given showing the degree of resistance of Brazilian wheat varieties to the four stem rust races; Frontana, Rio Negro and 242-M-5 are noted as especially resistant.

Crosses have been made between stem rust resistant varieties Red Egyptian, Kenya 58 and Timstein S 990 on the one hand, and the Brazilian varieties Fronteira [Frontier], Trintecinca [Thirty-five], Rio Negro and Frontana on the other. In the cross Fronteira x Timstein S 990, the resistance of the latter variety to race 11 and to race 17 of stem rust appears to be governed by two dominant genes respectively; the two genes are linked, the recombination value being $22 \pm 5\%$.

2573. LASSER, E.
Die Züchtung schwarzrostresistenter Weizensorten für den Alpenraum.
(**Breeding black-rust resistant wheat varieties for alpine regions**).
Bodenkultur, Wien 1951 : 5 : 67-75.

Data are given concerning the attack by black, brown and yellow rusts of 37 winter wheats and 42 spring wheats tested in Carinthia in 1939 and 1940. Of the winter wheats only Plantahofer showed any appreciable resistance to black rust; the spring wheats were all susceptible.

In 1940-41 some hybrid winter wheat lines produced at the plant breeding station at Halle-Saale in Germany were tested, and some proved highly resistant. From this material several promising wheats have been selected by Austrian breeding firms. They are resistant to black rust and less prone to lodging and shedding than older Austrian wheats; three of them, Dr Lassers Dickkopf [Dr Lasser's Squarehead], Reichesberger St. 39 and Admonter Frühweizen [Admont Early wheat] are from Thatcher x Kronen and one, Reichesberger St. 42, is from Thatcher x Heine IV. The first-named is rapidly replacing Plantahofer, which it has exceeded by 7.37-8.68 centners per ha. in yield. Further hybrids with better straw yield and baking quality are now under observation.

Spring wheats resistant to black rust were obtained from the USA and from crosses of them with Austrian and German varieties, some promising hybrids of high baking quality which are resistant to both black rust and mildew have been produced. Observations on the black rust biotypes showed 21, 90, 94, and 161 to be the prevalent races in the Alps.

2574. THOMPSON, W. P.
Some problems in the cytogenetics of cereals : a historical review.
 Trans. Roy. Soc. Can. 1949 : 43 : Sect. V : 35-44.

Research carried out in Canada on the genetics of rust resistance in wheats and the factors influencing sterility is surveyed. Reference is made to the study of chromosomes at the meiotic division of hybrids, from which chromosome homologies have been determined and evolutionary relationships revealed. The use of colchicine-induced polyploids in the artificial synthesis of common wheat from its putative ancestors, *Triticum turgidum* and *Aegilops speltoides*, is described.

2575.
Promising new hybrid wheat.
 Agric. Gaz. 1951 : 62 : p. 212.

A new hybrid wheat, as yet unnamed, with good quality grain and straw and resistance to stem rust has been developed at the New England Experiment Farm, New South Wales, from the cross Pusa 111 x Kenya C6041 x Baringa C15418. It is expected to replace Yalta in many areas.

2576. NOLL, A.
 Über mikroskopische Anfangssymptome der Resistenz und Anfälligkeit von Weizensorten gegen *Puccinia glumarum*. (**On microscopic initial symptoms of resistance and susceptibility of wheat varieties to *P. glumarum***).
 Phytopath. Z. 1951 : 17 : 400-05.

Staining tests of a number of wheat varieties have shown that, shortly after their inoculation with races of *P. glumarum*, correlations can be observed between susceptibility of the wheat variety to infection and mycelial growth in conjunction with the appearance of blue stained host cell complexes in the infected area. Such correlations were particularly clear where there was extreme susceptibility or resistance, but not so clear when susceptibility was intermediate.

2577. NAUMOVA, N. A.
(The effect of temperatures during the growth period of spring wheats upon their susceptibility to brown rust).
 Bot. Zh. (Bot. J.), Moskva 1951 : 36 : 39-46. [Russian].

Wheats are divided into three groups regarding their resistance to brown rust: (a) susceptible varieties; (b) resistant varieties; and (c) varieties whose susceptibility shows great variation, their resistance being associated with external temperatures during the early growth period. The last named group of varieties includes Marquis, Hope, Garnet, Thatcher, Turcicum 23819, Lutescens 22711, Lutescens 062 and Hordeiforme 027. In the present experiments the effect of different sowing dates upon the resistance of these varieties to two races of rust was studied. Analysis of the data showed that temperatures during the early phases of development were associated with the resistance of the varieties during earing. This relation was more apparent in respect of resistance to race 20 than to race 17. High temperatures during the early phases of growth had the effect of increasing the varietal susceptibility to rust, and low or moderate temperatures resulted in improved resistance during the earing stage.

Varieties Marquis, Garnet and Hope showed a high degree of resistance to rust when the average temperatures during the shooting and tillering stages did not exceed 8.7° C. On the other hand, they became highly susceptible to the disease when the temperatures during those stages exceeded 13.1–16.9° (Marquis), 13.4° (Hope) and 13.1° (Garnet). Thatcher, Hordeiforme 027, Turcicum 23819 and Lutescens 22711 showed resistance to rust during earing when the average temperatures during their early development did not exceed 5–15°. The critical average temperatures for each variety could not be established in the present experiments.

2578. WALDRON, L. R.

Breeding for rust resistance in tropical Africa.

Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1951 : 13 : 218–19.

Problems of wheat breeding for rust resistance in North America and tropical Africa are briefly compared. At the North Dakota Agricultural Experiment Station some hybrid selections, involving wheat from Kenya with respect to one parent, have exhibited resistance to rust, including race 15B of stem rust. Breeding material developed in North Dakota has recently been dispatched to the Nairobi Experiment Station for use in developing leaf rust resistant wheats.

2579. ÅKERMAN, Å.

Svalöfs Rivalvårvete (01029 b). [**The Svalöf spring wheat Rival (01029 b)**].

Sverig. Utsädesfören. Tidskr. 1951 : 61 : 45–49.

Rival, a selection from Diamant II [Diamond II], was released in 1951 to replace the latter, to which it is superior in grain yield and in stiffness of straw. Its straw is shorter but in other respects it resembles Diamant II and is probably as early.

2580.

Ottimo comportamento di nuove varietà di grano. (**Excellent performance of new varieties of wheat**).

Agric. Venez. 1950 : 4 : p. 305.

In the local competitive trials in Reggio Emilia, Italy, the wheat Funo did best with a yield of 64.10 q. per ha. and 0.10 came next with 62.80 q. Even under the very unfavourable conditions of the Grosseto marshes Funo gave 28 q. per ha.; in the same region Fortunato, another good variety, averaged 25 q. per ha.

2581. STENSTRÖM, J.

Vårvete och havresorter för södra Finland. (**Spring wheat and oat varieties for southern Finland**).

Tidskr. Lantm. 1951 : 33 : 26–27.

This comparative analysis shows the relative importance of some Finnish and Swedish bred wheats and oats when grown on a field scale. The wheats compared include Brons [Bronze], Pondus, Kärn II [Kernel II] and the Finnish variety Touku from Jockis. Touku has yielded 5% more grain than Diamant [Diamond] which it has also surpassed in stiffness of straw, baking quality and earliness; it also does well on clay soils. From a comparison of the Finnish oats Sisu, Eho and Tammi with Sol II [Sun II] and Guldregn II [Golden Rain II] it is clear that Eho is a good variety for the clay and moraine soils of central Finland, its straw being stiffer and its growth period shorter than that of Guldregn II. For southern Finland Sisu and Sol II are probably the best; they are similar in earliness, yield of grain and straw, but Sisu is much hardier and therefore superior to Sol II, as oats are grown mostly on the poorer soils.

BUCKWHEAT

2582. KROTOV, A. S.

(The production of hybrid seed of buckwheat in mixed varietal fields).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 10 : 1-5. [Russian].

At Puškin, Leningrad province, and Gorki, Mogilev province, the effect of free cross pollination upon the yielding capacity of several varieties of buckwheat was studied. The results of the experiments in which the varieties were grown in pairs, in alternate rows, are discussed. It is concluded that each component of every pair of varieties became nearly as productive as or more productive than its higher yielding parent grown by itself, and that the yields of the hybrid progenies were invariably higher than those of the more productive parent varieties. No yield increases occurred in Burjat-Mongol'skaja [Burjat-Mongolian] grown in alternate rows with Terehovskaja, while the yield of the latter in fact became lower than when it was grown by itself. However, the hybrid progenies of Terehovskaja showed greater productiveness than the pure variety.

At Puškin, the best results were obtained with cross pollination between Kazanskaja [Kazan] and Bogatyryj [Hero]; at Gorki, with cross pollination between Terehovskaja and Bogatyryj.

The seed of all varieties became heavier as a result of cross pollination, the highest increases in 1000 grain weights being observed in Terehovskaja pollinated with Bogatyryj and in Kazanskaja pollinated with Terehovskaja.

2583. MORRIS, M. R.

Cytogenetic studies on buckwheat. Genetic and cytological studies of compatibility in relation to heterostyly in common buckwheat, *Fagopyrum sagittatum*.

J. Hered. 1951 : 42 : 85-90.

Significant differences in seed set were obtained between compatible and incompatible crosses; no significant differences in seed set were recorded between selfings and incompatible crosses, or between the compatible crosses long style x short and short x long. Cytological investigations revealed that in compatible matings the pollen tubes reached the base of the styles within 15 minutes after pollination, but that in incompatible combinations the growth of the tubes was checked at the base of the stigma in the short style and in the lower half of the long style. In the interspecific cross between common buckwheat and *F. tataricum*, pollen tubes of the former reached the base of the styles of the latter within 20 minutes; the growth of pollen tubes of *F. tataricum* on the other hand was inhibited in styles of common buckwheat. The behaviour of pollen tubes of *F. tataricum* in the long and short styles of common buckwheat was identical with that of the behaviour of pollen tubes in incompatible matings within common buckwheat. No hybrids between the two species were secured.

2584. FROLOVA, S. L. and

MANSUROVA, V. V.

(The effect of external conditions upon the development of the hybrid embryo of buckwheat).

Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1949 : 69 : 77-80. [Russian].

The evidence suggests that mixed cultivation of diploids and tetraploids of buckwheat will not result in the production of triploid seed, although cross pollination and development of triploid embryos during the initial stages of growth will reduce the yields.

OATS

2585. GRIFFITHS, R. L.

Oat varieties.

J. Dep. Agric. S. Aust. 1951 : 54 : 371-76.

Varieties suitable for South Australia are described, including several which are grown in other States and which appear to be worthy of trials by farmers in South Australia.

2586. HENKE, F.
Unsere Haferzüchtung. (**Our oat breeding**).
Unsere Saatzucht Hasselhorst : 21-25.

The characteristics of the well known oat varieties Flämingsgold and Flämingsstreue are compared in detail. The origin of both varieties was a cross between a white oat variety from Upper Silesia and Lochow's Gelbhafer [Yellow oat].

Eight new strains of oats are at present undergoing tests to find out whether any of them surpass Flämingsgold or Flämingsstreue.

2587. DERICK, R. A.
A new variety of oats for eastern Ontario.
Sci. Agric. 1951 : 31 : p. 176.

A new variety, Lanark CAN 733, has been developed at the Central Experimental Farm, Ottawa, Canada, from seeds obtained in 1938 from the cross Onward x (Anthony x Bond) made by the Department of Science and Industrial Research at Lincoln, New Zealand. The variety is early maturing, resistant to lodging, loose smut, covered smut, Victoria blight, races 1, 2, 5, 8 and 10 of stem rust, all races of crown rust except 33, 34 and 45, and has a medium large grain enclosed in brown coloured glumes. Although the variety has limited adaptation, it is being released in eastern Ontario where rust is prevalent and early maturity and good straw are of importance.

2588. ATKINS, I. M.
Mustang oats.
Bull. Tex. Agric. Exp. Sta. 1950 : No. 728 : Pp. 10.

A detailed description of the new winter hardy, rust resistant oat Mustang (Lee x Victoria) is given (cf. Abst. 1791).

2589. SUMANOV, E. JA.
(The conversion of oats into *Avena fatua*).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :
73-74. [Russian].

The development of hulled oat seed, *Avena fatua* seed and seed intermediate in character was observed at Kurgan in the same panicles of *Avena sativa* var. *inermis*. The formation of the different types of seed is associated with the position of the seed in the panicle.

2590. TESSI, J. L.
Presencia de "*Pseudomonas coronafaciens*" en la Argentina y reacción de algunas variedades de avena frente a este parásito. (**The occurrence of *Pseudomonas coronafaciens* in Argentina and the reaction of some oat varieties to this parasite**).
Rev. Invest. Agric., B. Aires 1949 : 3 : 319-34.

A table is presented giving the reaction of a large number of oat varieties grown in Argentina to *Ps. coronafaciens*. La Estanzuela F2 au 12 and DL M3 are recorded as most resistant, followed by La Previsión 13 and Letoria CI 3392, and then by Quincy Red [Quincy 1] CI 4077, Lee CI 2042 and Buck sel. 212.

2591.
Cody, new oat variety, released in Wyoming.
Crops and Soils 1951 : 3 : No. 7 : p. 30.

A new mid-season oat with short strong straw, high yielding capacity and resistance to stem rust, crown rust and smut has been released for the Wyoming area by the US Department of Agriculture in cooperation with Wyoming Agricultural Experiment

Station. Known as Cody, the new variety was developed from a cross between Bannock and a Victoria x Richland selection.

2592. FOSSEUX, G. DE,
BARRAUD, A. and
MAYER, R.
Expérimentation sur les variétés d'avoine de printemps 1945-1949.
(Experiments on the varieties of spring oats 1945-49).
Bull. Techn. Inform. Ingén. Serv. Agric. 1951 : No. 57 : 187-93.

Particulars are given of a series of oat trials in various localities in France differing in soil and climate. French varieties were compared mainly with well known Swedish oats, though one Dutch and one German variety were also included in the trials. Selection in progress aims at increasing resistance to disease, especially smut. Newer varieties, e.g. Soleil II (= Sol II [Sun II]) and Jaune d'Artois, should replace some of the older oats in French agriculture.

2593. HÜBNER, R.
Vierjährige Untersuchungen über Kornqualität und Leistungseigenschaften des Hafers. II. Teil: Chemische Untersuchungen, Ertragsleistungen und Schlussbetrachtung. **(Four year experiments on grain quality and performance characteristics of oats. Part II. Chemical investigations, yields and conclusion).**
Z. Acker- u. Pflanzenbau 1951 : 93 : 169-97.

The morphological and physiological characteristics of ten oat varieties having been treated in Part I (cf. Abst. 1793), the author now gives the results of the investigation of chemical composition, which has an important bearing on the processing of oats for foodstuffs and on their use for fodders. The fat, protein and starch contents and the yields of grain and straw of the varieties are shown in tables.

RYE

2594. PODKIN, A.
(The rye variety Volžanka for the Primorje).
Kolhoznoe Proizvodstvo (Collective Farming) 1951 : No. 2 : p. 60.
[Russian].

The winter rye Volžanka [Volga], which was developed at the Institute of Grain Farming for the South East, Saratov, outyielded all local varieties in the trials conducted in the Vladivostok district of the Primorskiĭ territory. Its yield was 27.8 c. per ha.

2595. BAĪČUROVA, H. H.
(The winter rye variety Kazanskaja 5 + 6).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 8 : 55-57. [Russian].

Breeding work with rye, including the history of the variety Kazanskaja 5 + 6 [Kazan 5 + 6], at the Kazan State Breeding Station is described. Kazanskaja 5 + 6 is hardy and shows resistance to drought and shedding. Its resistance to lodging is the same as that of Vjatka and Avangard [Avant Garde]. The variety has been made a standard for the autonomous Tartar, Čuvaš and Mordva republics and several provinces of the RSFSR and shows promise elsewhere in the USSR.

At Kazan, breeding work is in progress to improve the yielding capacity, hardiness and grain quality of the variety.

Recent selection of Kazanskaja 5 + 6 has given a family 29, which outyielded the initial standard variety by 2.2 c. per ha. Work on the improvement of the family is in progress. The Mičurinite breeding methods used at the Kazan State Breeding Station since 1946

have included the building up of varieties from populations obtained by intravarietal cross pollination. In 1949 one such population, 18, yielded 1.02 c. per ha. more than Kazanskaja 5 + 6. The new variety was obtained from the best uniform families of Kazanskaja 5 + 6 open-pollinated with Vjatka. Work on the improvement of the population is in progress.

2596. FERWERDA, F. P.
Inteelt en heterosis bij rogge. (**Inbreeding and heterosis in rye**).
Landbouwk. Tijdschr., Wageningen 1951 : 63 : 319-30.

The subject of this paper has already been treated by the author in an address previously reviewed (cf. Abst. 1803), but the actual experiments here reviewed were concerned with the possibility of obtaining valuable F_1 hybrids of inbred ryes on a large scale. A study of cross pollination among inbred lines grown under conditions of open pollination showed marked differences between the lines as regards the tendency to selfing or cross pollination. Evidence was found refuting the theory that in some lines a preference for foreign pollen exists and in others a preference for selfing. It should also be remembered that the high incidence in some lines of progeny resembling the female parent may be due to physiological causes, e.g. differences in the flowering rhythms of the parents, inadequate opening of the glumes at flowering time, and differences in pollen fertility. Forms exhibiting cytologically conditioned male sterility might possibly be of use as parents, but the process would be complicated and possibly not worth attempting.

2597. YAKUWA, K.
(**On the behaviour of supernumerary chromosomes in rye**).
Jap. J. Genet. 1944 : 20 : 72-73. [Japanese].

On crossing 14-chromosome ryes with types carrying 2 or 4 supernumerary chromosomes, the progeny most frequently bore even numbers of supernumeraries. Meiosis in the 16-chromosome type was usually regular.

2598. KRUTISOVSKIĬ, V. K.
(**The results of trials of Deržavin's perennial rye**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :
72-73. [Russian].

Trials at the Dmitrovskii State Varietal Field, Moscow province, of a perennial rye bred by A. N. Deržavin suggest that this variety shows little promise north and east of Moscow.

2599. MOLOTKOVSKIĬ, G. H.
(**Winter ryes with branching ears in the Bukovina**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :
26-30. [Russian].

Mičurinite training and breeding work with winter ryes in the Bukovina is reported. The initial material consisted of two branching ears of a winter rye originating from the Kazah Scientific Research Institute of Agriculture. The grains from these ears gave plants with normal ears and with ears showing varied degrees of branching. Cultivation upon good soil and selection had the effect of increasing the proportion of plants producing branching ears.

As a result of selection and cultivation under Bukovina conditions three productive land varieties were obtained, which in the 1949 trials appreciably outyielded Petkusskaja 194 [Petkus 194]. The land varieties had better tillering capacity, longer ears, more grains per ear and heavier grains than Petkus 194.

The plants of the most productive new variety form extensively branching ears. Subsidiary ears branching off the main ear may number 2 to 26, each of which produces 4 to 10 grains. The subsidiary spikelets are found at the base of the main ear, in the centre or at the apical

end of the ear, and sometimes all over the main ear. Some individuals have bifurcate ears. The percentage of plants with branching ears in 1949 was 38–60%. Agricultural methods that may result in a higher proportion of branching ears are being studied.

A less extensively branching long eared variety producing some spikelets with three grains is remarkable for the length of its ear and its large grains. The population comprises plants with dense and lax ears. The straw and ears of the former become darker as the plants reach maturity. The third new variety has a long nonbranching ear. Normally the ear is dense, but some individuals have lax ears of lighter colour.

Occasional individuals which have shorter internodes and produce lateral stems at the nodes have occurred in the variety with branching ears. The lateral stems of these plants developed small but normal ears.

MAIZE

2600. ROBINSON, H. F.,
COMSTOCK, R. E. and
HARVEY, P. H.

Genotypic and phenotypic correlations in corn and their implications in selection.

Agron. J. 1951 : 43 : 282–87.

The 28 possible genotypic and phenotypic correlations were computed from combined analyses of three of the maize populations previously studied for an estimate of heritability summarized in *Plant Breeding Abstracts*, Vol. XX, Abst. 265, with respect to plant height, ear height, husk extension, husk score, number of ears per plant, ear length, ear diameter and yield. High positive correlation was found between the yield and number of ears per plant; a lower degree of correlation was observed between yield and plant and ear height. Ear length and ear diameter had low positive or negative correlations with all other characters.

Various selection indexes were constructed and the expected genetic advance from the use of each was determined. A comparison is given of the relative efficiency of the different selection indexes and selection for yield alone.

- 2601.

Memoria de la quinta reunión de maíz 27 y 28 de Julio de 1950, en la Estación Experimental Pergamino. (**Report of the fifth meeting on maize, 27 and 28 July 1950, at the Pergamino Experimental Station**).

Minist. Agric. Ganad. Nación, Argentina 1950 : Pp. 213. (Mimeographed).

The average maize yield in the Pergamino area, the centre of the maize growing zones of Argentina, is 25 quintals per ha., which compares favourably with that of Iowa, with 28 quintals. When the Argentine maize has been subjected to as intensive breeding as that of the USA, still higher yields are to be expected. The object of this meeting was to enable the specialists working on this task in Argentina and Uruguay to exchange information. The following contributions were concerned with plant breeding:—

Andrés, J. M.

Licopina en el grano del maíz—una nueva mutación subletal, recesiva monogénica. (*Lycopene in the maize grain—a new sublethal, recessive, monogenic mutation*).—(p. 9).

The mutant in question lacks the capacity to convert lycopene into carotene in the seeds, which when sown give rise to albinos. The gene concerned proved to be linked with *pr bm l* in chromosome V, the cross-over percentage with *Prpr* being 30.

Rossi, J. C.

Caracteres genéticos recesivos simples y duplicados aparecidos en planta en poblaciones antiguas de maíz. (Simple and duplicate recessive genetic characters which have appeared in the plant in ancient populations of maize). (pp. 11-20).

The Argentine Republic contains a great wealth of local types of maize, many of which are however rapidly disappearing. Intensive efforts are now being made to preserve them and study their gene content. In the course of this study many recessive types such as variegated, chlorophyll deficient and dwarf appeared and are here enumerated, with indications of their frequency.

Savoia, H. J. and
Abalo, R. A.

Comportamiento de variedades comerciales, híbridos y material de crianza, a la "podredumbre del pié" del maíz. (Reaction of commercial varieties, hybrids and breeding material to foot rot of maize). (pp. 29-36).

Observations on natural infection with *Sclerotium bataticola* in a year of serious attack were made on a collection of varieties, inbred lines and single and double crosses. The varieties showing the least infection were Colorado Manfredi and Colorado SG 39 (65)MA. Several of the inbred lines and single crosses were classed as good but the majority of the double crosses were rather poor. Comparisons of a large number of lines and their hybrids indicated that resistance was usually dominant.

Canel, M.

Sincronización de la floración femenina y masculina del maíz en su relación con la sequía. (Synchronization of the male and female flowering in maize in relation to drought). (pp. 41-43).

Under conditions of drought the appearance of the stigmas is delayed more than the production of pollen, a difference of 20 or 30 days having been observed in some of the most susceptible varieties. Selections were made over a number of successive years for plants with the earliest development of the stigmas. After six years of selection the interval between pollination and the appearance of the stigmas was only 6.8 days, as against 9.6 days in the unselected population, and there were indications that the selected population suffered slightly less loss in yield from drought.

Lázaro, R. C.,
Navarro, G. and
Alaggia, H. A.

*Segunda comunicación sobre heterosis en cruza-
mientos "intertipo." (Second communication on
heterosis in intertype crosses). (pp. 45-47).*

Uruguayan dent inbreds were used to pollinate flint and dent varieties but no differences were observed between the two types of cross. The same was true when imported dent inbreds and local flint inbreds were used as pollinators and it is concluded that the dent and flint types do not differ in the yield factors they may contribute. Certain lines, such as Hayes' Golden from Kansas and Yellow Synthetic from Minnesota, gave an exceptionally high proportion of successful combinations.

Rossi, J. C.

Estudio fitotécnico de poblaciones regionales de maíz. (Study of regional populations of maize from the point of view of breeding). (pp. 49-52).

The local varieties of maize cultivated in Argentina have mostly descended from material introduced from southeastern Europe, though a few of them, such as the bitter maizes, have originated from intercrossing with indigenous maize. This illustrates the value that the local populations might have as a source of breeding material and a special study of them is being made at the plant breeding station at Pergamino. Some of them already excel the commercial varieties in yielding ability.

Videla, R. O.

Prueba anticipada de la aptitud combinatoria.
(*Early testing of combining ability*). (pp. 53-61).

A reexamination of the results of Payne and Hayes (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 278) shows that if selection had been carried out on the basis of the F_2 results with the different testers, most of the best lines would have been selected and it would have been possible to concentrate the breeding work on the families with the highest yielding abilities. This method is therefore being applied at the Rafaela station in Argentina, with a number of lines from different parts of the country, using the double cross Santa Fe 3 as maternal tester.

Rosbaco, F.

Variedades sintéticas. (Synthetic varieties).
(pp. 63-66).

At the Tezanos Pinto experimental station synthetics have been made containing 3, 5, 7 and 8 inbred lines and all were inferior to open-pollinated varieties in yield. However, they were made without testing combining ability and a new approach, taking this into account, is being made.

Rosbaco, U. F.

El material del maíz "amargo" de la Estación Experimental Nacional de Tezanos Pinto. (The material of "bitter" maize at the Tezanos Pinto National Experimental Station). (pp. 67-68).

A study of a number of hybrids of the Amargo [Bitter] maize has shown that although the character is conditioned by a single factor, this factor has a multiple effect, so that it has not so far been possible, for instance, to select forms combining high locust resistance with coloured flint or dent corn.

Experiments on the production of synthetics from bitter maize have begun.

Pujals, E. A.

Maíces híbridos azucarados. (Sweet corn hybrids).
(pp. 69-76).

In tests of various sweet corn hybrids at the Pergamino experimental station, Argentina, the best hybrids in respect of yield were Ill. 14 x Ill. 13, Ill. 8 x Ill. 6, and Golden Cross Bantam P39 x P51. The last-named is the best in quality.

Dussel, F. G.

Consideraciones sobre la introducción del maíz híbrido en la producción nacional. (Considerations on the introduction of hybrid maize in the production of the country). (pp. 77-84).

The maize produced in Argentina consists mainly of flint types with coloured or yellow grain, which is more popular in the international market than the dent types of the USA. A wholesale introduction of maize hybrids from the USA is therefore not recommended. In the discussion, certain advantages of dent corn, for internal consumption and even possibly for export too, were pointed out.

Abalo, R. A.

Comportamiento de híbridos tipo dentado y duro de origen Norteamericano y del país, en Pergamino. (Behaviour at Pergamino of hybrids of the dent and flint type of North American and local origin). (pp. 85-89).

The double cross flint hybrid Santa Fe 3 exceeded Colorado Klein, the standard open-pollinated variety, in yield. The dent hybrid US 13 gave higher yields still in good years but was much inferior in drought years, whilst other hybrids such as US 35, Kansas 2234 and Pergamino double crosses 1 and 2 outyielded the open-pollinated varieties even in drought years.

Grieben, H. L. G.

Resultados de los ensayos comparativos con variedades e híbridos comerciales de maíz. (Results of comparative tests with maize varieties and commercial hybrids). (pp. 91-111).

Tabular data are given concerning 43 tests carried out in the main maize-growing area of

Argentina and a number of marginal areas. On the whole the hybrids were superior to the commercial varieties.

Gheorghianov, V. *Ensayo comparativo de maíces Argentinos y Uruguayos. (Comparative test of Argentine and Uruguayan maizes). (pp. 113-29).*

Among the forms tested for eight years in Uruguay, the hybrid Santa Fe 3 gave the best results in the widest range of conditions. It exceeded the commercial varieties by an average of 20% in yield.

Condiciones mínimas que deberán satisfacer los establecimientos para ser inscriptos en la categoría de criaderos semilleros o introductores de maíces híbridos. (Minimum conditions that must be satisfied by establishments in order to be included in the category of seed producers or introducers of hybrid maize). (pp. 198-201).

The conditions laid down by the Argentine Ministry of Agriculture are specified.

Condiciones mínimas que deberán satisfacer las nuevas selecciones para ser consideradas en inscripción. (Minimum conditions that must be satisfied by new selections in order to be considered for registration). (pp. 204-206).

The categories simple, double, and triple hybrid, top cross and multiple hybrid are defined, together with the other characters taken into consideration in deciding whether a new maize hybrid shall be officially registered in Argentina.

2602. MOSOLOV, V.
 (Maize in the northern districts).
 Kolhoznoe Proizvodstvo (Collective Farming) 1951 : No. 4 : 26-28.
 [Russian].

Several early maturing varieties of maize recently developed in the USSR are listed. Kazanskaja 7 [Kazan] 7 and Hybrid 8 were developed at the Kazanj State Breeding Station. These varieties yield 20 to 30 c. grain per ha. and have growth periods of 100 days. Another early variety Čakinskaja Žemčužnaja [Čakinskaja Pearl] was bred at the Čakinskaja State Breeding Station, and Belojaroje Pšeno [Unbleached White Millet], Minusinskaja Belaja [White Minusinsk] and Pervenec [First Born] were derived from local maizes in Siberia.

A new early variety Zakamskaja [Transkama] was obtained in the Tartar ASSR by crossing maizes of different origins and selection and directed training of the hybrid progenies. This variety has a growth period of 100 to 110 days and high yielding capacity. The plants are 1.5 m. tall and produce 15 to 25 cm. long ears. Most plants develop two ears each weighing 126 grm. The 1000 kernel weight of Zakamskaja is 290 grm.

2603. LANZA, F.
 Coltivazioni foraggere con mais ibridi dentati di seconda generazione.
 (Second generation dent maize hybrids grown as a fodder crop).
 Ital. Agric. 1951 : 88 : 362-67.

Instead of using the seed of double crosses only for consumption the author tried sowing some of it for use as fodder, an open-pollinated variety Caragua being used as control. The hybrids gave a slightly lower yield of green matter than Caragua but yields deemed satisfactory were obtained from Iowa 300, Indiana 608 C, U 50 and Ohio C 92.

2604.

Instituto Nacional para la Producción de Semillas Selectas. Experiencias con maíces híbridos americanos. (**National Institute for Select Seed Production. Experiments with American hybrid maize**).

Bol. Inform. Minist. Agric., Madrid 1951 : 4 : No. 27 : 41-43.

Further data are given concerning the behaviour of the American maize hybrids supplied by FAO (cf. Abst. 1834) and tested in 1949, a very dry year, at Pamplona and Zaragoza. Some of the hybrids yielded considerably more than the local standards.

2605.

Milhos híbridos. (**Maize hybrids**).

Estud. Inform. Téc., Direcç. Ger. Serv. Agríc., Lisboa 1951 : No. 35 :

Pp. 41.

Details are given of the vegetative period, height, grain yield, and relative weights of dry grain and cob of a series of American maize hybrids being tested over a chain of trial grounds in Portugal.

2606.

LE CONTE, J.

Le maïs hybride aux États-Unis d'Amérique. (**Hybrid maize in the United States of America**).

Arch. Inst. Rech. Agron. Indochine 1950 : No. 5 : Pp. 190.

This publication embodies a report on a mission undertaken by the author to study hybrid maize production in USA, in order to find out whether the use of hybrids could be successfully introduced into Indochina.

The first three chapters are of theoretical interest, and, dealing with the taxonomy and origin of maize, maize genetics, and heterosis, provide the genetical basis for a consideration of the various systems of selection. The next two chapters are devoted to new methods of selection and pure and hybrid lines and how they are obtained. The last three chapters are concerned with: the practical aspects of hybrid seed production; agricultural experimentation and maize cultivation, including genetic control of borer damage; and economic aspects of maize production in the USA.

2607.

SPRAGUE, G. F. and

MILLER, P. A.

New corn hybrids for Iowa.

Iowa Fm Sci. 1951 : 5 : 137-78.

Four maize inbreds, B6, B7, B10 and B14, are available for the production of several new hybrids. Line B6 has been derived from inbred I205; it is more resistant to disease and has larger ears and improved seed viability than its parent strain. B7 was obtained from an old unreleased line, I233; resistance to lodging is one of its valuable characters. B10 and B14 are sister lines from Stiff Stalk Synthetic; B14 possesses more resistance to root lodging and stalk breakage than any other line tested. The lines are being released in the following single cross combinations: L289 x B6, WF9 x B6, WF9 x B7, WF9 x B14 and B10 x B14. Information is given on new double hybrids involving these and other single crosses, which are recommended for trial by farmers.

2608.

MENEZES, O. B. DE.

Novo método de previsão do híbrido múltiplo resultante do cruzamento de dois híbridos triplos (3 x 3). [**A new method of predicting the performance of the multiple hybrid resulting from crossing two three-way hybrids (3 x 3)**].

Rev. Agric., S. Paulo 1951 : 26 : 43-47.

A statistical analysis is worked out of the performance to be expected from the progeny obtained by intercrossing two three-way maize crosses.

2609. GUNDY, L. J.
Prediction of corn hybrids from single cross data.
 Agron. J. 1951 : 43 : 245-46.

The use of charts, coded data slips and tally sheets for facilitating the prediction of the performance of the double cross maize hybrids according to method B of Jenkins is described.

2610. EVERETT, H. L.
Mankind's debt to Mendelism: hybrid corn (*Zea mays*).
 Z. Pflanzenz. 1951 : 29 : 394-405.

Literature concerning the genetic control of hybrid vigour in maize is discussed. Particular reference is made to the following: the hypothesis of dominance of linked genes; Ashby's claims regarding the initial physiological advantages of a hybrid embryo; methods of recurrent selection and recurrent reciprocal selection (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 263), devised by Comstock *et al.*; theories of Crow and Henderson (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 714 and 1550), based on the dominance of favourable genes and gene interaction; and the influence of suppressor mutants.

2611. FENAROLI, L.
 Norme per la coltivazione dei mais ibridi, campagna 1951. (**Requirements in the cultivation of hybrid maizes, season 1951**).
 Pubbl. Staz. Sper. Maiscolt., Bergamo 1951 : No. 61 : Pp. 8.

Italian growers are instructed about the value of hybrid maize and the importance of choosing a hybrid suitable to the particular locality where it is to be grown.

2612. SKAARE, S.
 Grønnfôrmais. (**Green forage maize**).
 Samvirke, Med. Felleskjøpet, Oslo 1951 : 46 : 93-95.

Hybrid maizes from Canada and US have been tried in Norway with success. Wisconsin 240 gave the highest yields.

2613. KAVANAGH, L. R.
The story of hybrid maize.
 Agric. Gaz. N.S.W. 1951 : 62 : 61-66, 72, 119-24, 173-74, 179-81.

A popular account is given of maize breeding. The differences between self and cross pollination are outlined and deficiencies in the mass selection and ear-to-row methods of improving lines are indicated. A discussion of the relative advantages of inbreeding and production of hybrid maize is followed by a short history of the development of different types of crosses, and details of techniques used in New South Wales for maintaining a high standard of registered hybrid seed. The genetical aspects of hybrid vigour are briefly outlined. Variation in the performance of a particular hybrid in different regions is noted, thus emphasizing the importance of growing only those hybrids recommended for each area.

The possibility of further improvements in resistance to disease, insects and lodging, and of the introduction of male sterility is mentioned.

2614. LE CONTE, J.
 Sélection généalogique du maïs et production de semence hybride.
 (**Pedigree selection of maize and production of hybrid seed**).
 Agron. Trop. 1951 : 6 : 43-54.

This article is based on part of the information collected during a mission to the USA to study hybrid maize production and estimate its possible value if introduced into Indo-China (cf. Abst. 2606).

2615. LE CONTE, J.
Réunion des experts du maïs a Clermont-Ferrand (23 au 27 janvier 1951).
[**Meeting of maize experts at Clermont-Ferrand (23-27 January 1951)**].
Agron. Trop. 1951 : 6 : 179-85.

In the course of discussions on the results obtained with F_1 hybrid maize in Western Europe and in Egypt and Morocco, the meeting also considered the following questions: international cooperation in trials and in exchange of samples for selection purposes; pure line testing; male sterility in maize; the methods of recurrent selection and cumulative selection; maize germination at low temperature; and resistance to corn borer.

2616. FENAROLI, L.
Rapporto sulla sperimentazione maidicola 1949. (**Report on maize cultivation experiments 1949**).
Pubbl. Staz. Sper. Maiscolt., Bergamo 1950 : No. 59: Pp. 44.

In this further report (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 925) on the introduction and testing of hybrid maizes in Italy, details are recorded of the performance of large numbers of hybrids at the Maize Experimental Station and other research institutions, as well as on various farms in many different localities. The records include information on ripening time as well as yields.

2617. MALIANI, C.
I mais ibridi nel Veneto. (**Hybrid maizes in the Veneto**).
Agric. Venez. 1950 : 4 : 81-86.

The maize trials of American and Italian hybrids, carried out in the Province of Veneto, Italy, are part of a general study of local adaptation as a factor in the successful exploitation of hybrid maize in Italy. In trials of 40 F_1 hybrids at the Badia Polesine station, the Italian varieties were surpassed by the numerous American hybrids, probably partly owing to too thin sowing. Selection of pure lines from the Italian varieties Marano Vicentino and Scagliola del Frassine is proceeding and they will be crossed to obtain Italian F_1 hybrids as well developed and productive as the American types.

2618. POPOW, G.
Sorten- und Anbaufragen im Maisbau. (**Concerning varieties and cultivation in maize growing**).
Schweiz. landw. Z. Die Grüne 1951 : 79 : 300-09.

Thirty inbred lines of maize isolated from Swiss land varieties are now ready to be tested as regards their suitability for use in the production of hybrid maize.

Silo maize trials at Oerlikon showed that most of the hybrid maizes tested, though more resistant to lodging than equally early ordinary maize, did not give the great increases in yields which might have been expected and which were obtained in the case of the hybrid grain maizes.

2619. ROGERS, J. S.
Fertility relationships in maize-teosinte hybrids.
Bull. Tex. Agric. Exp. Sta. 1950 : No. 730 : Pp. 18.

First generation hybrids between maize and the Mexican teosinte varieties Durango, Chalco, Nobogame and New showed approximately normal fertility, although the percentage fertility varied according to the teosinte variety used. F_1 hybrids between maize and the teosinte variety Huixta from northern Guatemala also exhibited relatively normal fertility, although the percentage fertility was lower than that of the hybrids involving the Mexican varieties. The F_1 hybrid between maize and the teosinte Florida from southern Guatemala, however, had an average pollen fertility of 49%. Intervarietal

teosinte hybrids were also investigated; hybrids between Florida and Mexican varieties showed 50% fertility; hybrids of Mexican varieties only were relatively normal in fertility. Analysis of back cross populations of the hybrids involving Florida has revealed that some factor or factors on chromosome 4 of maize, located very close to *Tu*, and between *Tu* and *su₁*, are responsible for most of the sterility of these hybrids. It appears that the sterility is due to the formation of non-functional gametes, carrying a certain segment near the locus *Tu* of the fourth chromosome of maize. The results indicate that maize and the teosintes of Mexico and northern Guatemala are similar in chromosome structure; and that differences in the fourth chromosome are of primary importance in distinguishing south Guatemalan teosinte from maize and other teosinte varieties.

2620. KINMAN, M. L.
Composite sibbing versus selfing in the development of corn inbred lines.
 Iowa St. Coll. J. Sci. 1951 : 25 : 273-75.

A comparison was made between maize lines each obtained by continuous selective mass sibbing of an *S*₁ progeny and lines secured by continuous selfing in the progenies of the same original self-pollinated ears from which the composite sibbed lines were derived. The results have led to the suggestion that composite sibbed lines can be satisfactorily substituted for homozygous lines as parents for hybrids in areas where maintenance of inbred lines is difficult or in a newly initiated breeding programme pending the development and testing of desirable inbred lines.

2621. MAZOTI, L. B.
 Nuevos hallazgos acerca del comportamiento de las unidades de la herencia: genes y plasmonio. (**New findings concerning the behaviour of the units of inheritance: genes and plasmon**).
 Rev. Argent. Agron. 1950 : 17 : 145-62.

This is a further version of the work referred to in *Plant Breeding Abstracts*, Vol. XX, Abst. 280. It is shown that the modification of the cytoplasm induced by the gene *ij* (*iojap*), which makes it incapable of reverting to normal green pigmentation when crossed again with normals, occurs only when these carried *r^r* and not when they carried *R^r* or *R^e*. It would therefore appear that the modification is not always irreversible, though the possibility that the reversion to normal is due to the compensating effect of new genes has not yet been entirely ruled out.

When a line possessing the plasmon of *Euchlaena* was used as maternal parent there was a marked deficiency of the variegated types expressing the *iojap* character. Several of the plants resulting, though of normal appearance, gave exclusively variegated plants when crossed with *ij ij* plants with *Zea* plasmon, showing that the character was not manifested in plants with *Euchlaena* plasmon. On the other hand variegation of the fine-stripe type conditioned by the gene *f* was transferred quite successfully to plants with *Euchlaena* plasmon.

Plants derived from reciprocal crosses between lines with *Euchlaena* and *Zea* plasmon respectively, but otherwise apparently identical, differed by up to 8 days in date of anthesis when grown under certain conditions, those with *Euchlaena* plasmon being the later.

2622. BIANCHI, A.
 Variabilità ed ereditarietà dei caratteri "altezza" e "altezza inserzione spiga principale" in granoturco. (**Variability and inheritance of the characters "plant height" and "height of insertion of the main ear" in maize**).
 Genetica Agraria, Roma 1950 : 2 : 285-308.

A study of crosses between the varieties Marano Vicentino and Nostrano dell'Isola showed low plant height to be dominant to tallness and that plant height is positively correlated

with height of insertion of the ear. The effects of climate and exposure to sunlight were also noted.

2623. ROMANENKO, V. I.
(Experiment with directed training in breeding the maize variety Groznenskaja 11).
 Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 10 : p. 69. [Russian].

A promising new mid-season variety Groznenskaja 11 [Grozno 11], still under trial, was bred at the Grozno Province Agricultural Research Station. It is as early as and more productive than the standard Groznenskaja Belaja Zubovidnaja [Grozno White Dent]. The initial material was a white dent variety, Pride of Solin, obtained from Kazakhstan. At Grozno, early and productive ears of this variety were selected and the kernels planted 10 to 14 days later than the normal sowing date. As a result of the changed external conditions many plants having short growth periods have been obtained. These were crossed artificially and their progeny selected for productive ears and earliness. The selected plants were then free cross-pollinated with Groznenskaja Belaja Zubovidnaja, remarkable for its earliness, and were then trained for productiveness and earliness in the first and later hybrid generations. Directed training consisted of late planting when soil and air temperatures were high.

2624. CELESTRE, M. R. and
 SCARASCIA, G. T.
 Osservazioni su alcuni ibridi di prima generazione fra granoturchi.
(Observations on some first generation hybrids of maize).
 Ann. Sper. Agrar., Roma 1950 : 4 : 953-67.

Hybrids of Strampelli's early maize Saverio, crossed by the sweet maize Golden Bantam, and of Saverio, crossed by Pirovano's Seminano, a maize obtained by electromagnetic treatment of the ovaries of Mokant and selfed for seven generations, were used in this study of the possible effects of normal pollen and pollen subjected to electromagnetic treatment or to X-irradiation, upon the descendants from such crosses. In general, earliness, tillering and yield were increased in both the treated pollen groups, while the action of some genes, e.g. *su* for sugar development, was partly inhibited. Judging from the phenotypes, none of the defects or anomalies of Seminano had been transmitted to the offspring.

2625. MILLER, P. A.
Use of chromosomal interchanges for investigating the inheritance of oil in the corn kernel.
 Agron. J. 1951 : 43 : 229-34.

Two inbred maize lines, one derived from the strain Illinois Low Oil and the other from Illinois High Oil, were crossed with chromosomal interchange stocks; the resulting F_1 plants were back-crossed with their respective inbred parents. Plants heterozygous for a chromosomal interchange could be recognized by their semisterility. Back cross progenies therefore segregated for semisterility as well as for genes conditioning oil percentage, and associations between genes for the latter property and points of breakage of the interchanges could thus be determined. The data are interpreted as favouring the hypothesis that oil content is controlled by a rather large number of factors, exerting small and approximately equal effects and distributed more or less at random over the ten pairs of chromosomes.

2626. SUTO, T.
(Extra chromosomes in maize).
 Jap. J. Genet. 1943 : 19 : 131-33. [Japanese].

A description is given of the meiotic behaviour of two lines of flint maize carrying one and four supernumerary chromosomes, respectively.

2627. ANDRÉS, J. M.
Mejoramiento de la fertilidad de maíces autotetraploides. (**Improvement of the fertility of autotetraploid maize**).
Rev. Argent. Agron. 1950 : 17 : 137-44.

Studies of meiosis were made in three tetraploid maize lines and in the F_4 of a hybrid between two of them. There was a very significant difference in bivalent number, the average per cell being 8.48 for the hybrid and 4.94 and 6.08 respectively for the two tetraploid parents.

The percentage of good pollen measured by the acetocarmine method was 96.50 in the hybrid and 87.60 and 93.85 respectively in the two parents. The percentage seed set in the hybrid was 85% as against an average of 73% in the parents, and by selection for fertility it was raised to 96% in the F_5 hybrid; fertility and yield in the hybrids remained however consistently lower than those of the best diploid variety Colorado Klein.

Vegetatively the hybrid is very robust but it is somewhat more susceptible to dry winds and hot weather than the diploids and slightly later in maturity.

2628. GILLES, A. and
RANDOLPH, L. F.
Reduction of quadrivalent frequency in autotetraploid maize during a period of 10 years.
Amer. J. Bot. 1951 : 38 : 12-17.

An analysis of chromosomes in an autotetraploid strain of maize, with respect to their synaptic association as bivalents or quadrivalents, was made at the beginning and end of a ten year period; the plants were grown in 1948 from seed harvested in 1937 and 1947. There were fewer quadrivalents and more bivalents per cell at diakinesis after ten years than at the beginning of the period; the average quadrivalent frequency was 7.46 and 8.47 per cell, respectively. The results suggest that autopolyploids having a characteristic multivalent chromosome association at the time of their origin may, after several generations, change to the bivalent type of association most common in diploids and allopolyploids. The mechanism of this change and controlling factors are being investigated.

The absence of multivalents appears to be due to an allopolyploid origin; many polyploids with regular bivalent configurations, previously assumed to be of allopolyploid nature, may have originated as autotetraploids.

2629. GOLUBINSKIĬ, I. N.
(**The mutual interaction between seed during germination**).
Priroda (Nature) 1950 : No. 10 : 58-59. [Russian].

The germination of the maize variety Žemčužina [Pearl] was accelerated by several days when (a) its soaked kernels were placed in jars containing germinating seed of Golden Bantam or (b) when the kernels were soaked in rain water previously used for soaking another sample of Žemčužina seed.

Mention is made of similar results obtained in experiments with beet, cucumber and radish and of an instance of stimulated germination of melon seed in a jar accidentally containing *Ipomaea* seed.

2630. RUSH, G. E. and
NEAL, N. P.
The effect of maturity and other factors on stands of corn at low temperatures.
Agron. J. 1951 : 43 : 112-16.

Stand of maize is often critically affected when cool wet weather follows planting; temperatures of 8 to 12°C. retard the physiological activities of the germinating kernels and thus predispose them to attack by soil organisms. Experiments have been carried out to

determine the effects of the following factors upon stand produced under conditions of low temperature: seed maturity; injury to the seed coat which occurs during mechanical seed shelling at different stages of maturity; and frost prior to harvesting. Seeds of five Wisconsin hybrids with different periods of maturity were used. Frost injury before harvest and seed maturity at time of harvesting were found to be important factors influencing stand at low temperatures. Relatively small differences among the hybrids with regard to seed maturity at a given harvest date may be less important in determining stands under conditions of low temperature than other genetically controlled differences between hybrids.

2631. BIANCHI, A.

Nota preliminare sulla fioritura di popolazioni di granoturco. (**Preliminary note on the flowering of populations of maize**).
Genetica Agraria, Roma 1950 : 2 : 276-84.

As part of a study of Italian maizes in relation to their place in Italian maize growing, as it is developing under North American influence, the author observed the course of flowering in Nostrano dell'Isola, Marano Vicentino and the cross Nostrano dell'Isola x Marano Vicentino. Marano flowered early and showed a steep and compact curve of the number of plants that flowered, whereas in Nostrano flowering began later and showed greater dispersal, and a greater interval between male and female flowers. The hybrid was intermediate but showed an asymmetric distribution, possibly as a result of heterogeneity of the varieties regarded as commercially pure.

2632. LIND, A. E.

(**Bisexual inflorescences in maize**).

Priroda (Nature) 1950 : No. 10 : p. 58. [Russian].

In the Tambov province, maize plants with bisexual inflorescences were found. The plants were half the normal size and produced ears 30 to 35 cm. above the ground. In some instances the tassels consisted of two main and four lateral rachillae. On both main rachillae and on the lateral rachilla at the proximal end of the tassel the spikelets produced besides the male spikelets single or clustered pistillate florets. At the apex the main rachilla showed a thick egg-shaped formation, which consisted of staminate and pistillate flowers. In other maize plants the tassels with perfect flowers were enveloped in leaves at their base.

2633. MILLER, P. A.

Variation of oil percentage in the corn kernel and a study of its inheritance through the use of chromosomal translocations.

Iowa St. Coll. J. Sci. 1951 : 25 : 301-03.

Problems of breeding for increased oil content in maize are discussed. It has been found that whole grain analyses for oil percentage would be satisfactory as a basis of selection in improvement work aiming at increasing the commercially recovered germ oil; increased oil content results primarily from (1) increased proportion of germ and (2) increased concentration of oil in the germ. Variation in total oil content of the kernel is only slightly associated with variation in concentration of oil in the endosperm; thus it should be possible to select strains with increased oil content which do not have a commercially undesirable level of oil in the endosperm. Variation in total oil percentage was not appreciably associated with variation in total protein percentage. Total oil percentage, however, was positively correlated with percentage germ protein ($r = +.36$ to $+.50$) and with relative concentrations of tryptophane in the kernel ($r = +.42$). Thus it appears that increased oil percentage may also result in relatively high quality protein in the grain. Stocks with chromosomal interchanges were each crossed with a high oil strain and a low oil strain; the F_1 plants, heterozygous for the chromosomal interchanges, were back-crossed to their respective low or high oil parent. The data from the back cross progenies

suggest that oil content was conditioned by a fairly large number of genes, exerting small and approximately equal effects, and distributed at random over the ten pairs of chromosomes.

2634. EMERSON, R. A. and
SMITH, H. H.

Inheritance of number of kernel rows in maize.

Mem. Cornell Univ. Agric. Exp. Sta. 1950 : No. 296 : Pp. 30.

Data are presented, with a preliminary interpretation of the inheritance of kernel row number, from numerous crosses between 22 inbred lines of maize at the Cornell University Agricultural Experiment Station. Crosses among inbreds of like row number were made with thirteen 12-rowed and six 8-rowed forms; the F_1 generation averaged more rows than the arithmetic mean of the parents. Crosses between 8 and 12-rowed forms frequently produced fewer rows, on an average, than the arithmetic average of the two parents. It appeared that during selection of 8 and 12-rowed lines certain inbreds had accumulated genes tending to decrease the number of kernel rows; in others, which were relatively fewer, genes for increasing the row number had accumulated. The results of crosses between 8-rowed inbreds and those with higher numbers of rows (16 or 18) showed that selection of F_2 parents with different row numbers produced significantly different F_3 progeny.

Inbred lines were proved to be highly homozygous by the fact that selection for diverse row numbers, from intercrosses among inbreds with the same row number, did not produce different means in the progeny. Among the 12-rowed inbreds, however, each of 11 lines differed from the others, with respect to the genotype for the number of kernel rows, so that it was possible to accumulate genes for higher row number by selection from multiple crosses between these lines; forms with 22 kernel rows have been obtained.

Further analyses of the data are in progress.

2635. MORGAN, D. T. (JUN.) and
RAPPEYE, R. D.

Polyembryony in maize and lily following X-irradiation of the pollen.

J. Hered. 1951 : 42 : 91-93.

Marked increases in the number of polyembryonic seeds and seedlings were obtained in maize and *Lilium regale* as a result of X-ray treatment of the pollen. Unattached and conjoined types were observed in both species. Root tip counts on polyembryonic maize seedlings arising from the crosses in which irradiated pollen had been used, and in twin seedlings occurring in the control plants, revealed the diploid number of $2n = 20$ for each member.

2636. FAIRCHILD, R. S.

Comparative development of the embryos of inbred and hybrid maize.

Iowa St. Coll. J. Sci. 1951 : 25 : 203-05.

From a study of the embryos of two inbreds, L 317 and B 1349, and their crosses, it was found that heterosis is expressed in the histological and morphological development of different parts of the embryo.

The hybrid L 317 x B 1349 and its reciprocal differed in rate of leaf initiation. Since the two hybrids are genetically identical the difference may be explained as the result of maternal influence, or alternatively to the effect of hybrid endosperm. Maternal influence was noted in the development of the first internode. Data on the radicle indicated that L 317 contributed favourable genes for the growth of the stele, while B 1349 imparted favourable genes for the growth of the cortex; heterosis in the radicle was therefore the result of the combined effect of favourable genes contributed by both parents and influencing histogenesis. The genes influencing early initiation of seminal roots appeared

to be dominant; a maternal effect was also noted in the case of this developmental character.

2637. ZUBER, M. S.

Effect of the Y-y factor pair on yield and other agronomic characters in corn.

Iowa St. Coll. J. Sci. 1951 : 25 : 392-94.

A comparison was made of the top cross performance of F_2 segregates with the factor Y or y derived from crosses between the mid-season yellow inbred WF9 and the late white inbred Mo 22. Top cross testers consisted of a white and a yellow open-pollinated variety. Back crosses to both parents were also used so that the Y and y segregates could be compared in residual genetic backgrounds of 25, 50 and 75% of the original genotype of each parental line.

No association was found between yield and colour of endosperm. Data on moisture content of the grain at harvest and on height of ear indicated that the y segregates were later in maturity than the Y segregates. Factors for later maturity appear to be linked with the factor pair for endosperm colour. Significant positive correlations between yield and moisture content showed that the later maturing segregates were producing higher yields. Plants from seed with white and yellow endosperm showed no differences in grade of husk cover, ear weight, number of days from planting to silking, or number of ears per plant.

2638. BRIMHALL, B. and
SPRAGUE, G. F.

Unsaturation of corn oil—inheritance and maturity studies.

Cereal Chem. 1951 : 28 : 225-31.

Iodine numbers were determined at Iowa Agricultural Experiment Station in high-oil and low-oil maize inbreds, derived from Illinois strains, and their F_1 and F_2 and back cross progenies. The mean of the F_2 was intermediate with respect to the parental averages. It is suggested that iodine number may be controlled by a minimum of four genes. A highly significant negative correlation was found between iodine number and oil content of both the embryo and endosperm, indicating that in breeding for increased oil percentage some reduction in iodine number of the oil will probably occur. However, it is hoped that the variations observed will make the development of strains with a high oil content and a medium iodine number possible.

The iodine number of the oil obtained from two inbreds and a single cross, harvested at different stages of maturity up to 60 days after pollination, remained fairly constant.

2639. FREY, K. J.

The interrelationships of proteins and amino acids in corn.

Cereal Chem. 1951 : 28 : 123-32.

Following a detailed analysis of the constitution of total protein in the grain of certain maize hybrids (cf. *Plant Breeding Abstracts*, Vol. Abst. 1778) bred at the Iowa Agricultural Experiment Station, the view is expressed that protein quality might be improved by selection for a larger embryo in proportion to endosperm; a corresponding increase in oil content would probably be obtained. As an alternative, selection of individuals with low zein content from present breeding material shows little promise of success. The possibility of producing mutant forms with a desirable zein: total protein ratio by subjecting inbreds to X-ray treatment is suggested.

2640.

Results of co-operative hybrid maize tests in Europe—1949.

FAO, Washington 1950 : Pp. 33.

The development of the cooperative programme of testing maize hybrids in Europe and the Near East which has been organized by FAO is outlined (cf. Abst. 290) and the results of the trials carried out during 1949 are reported in detail (cf. Abst. 1016).

2641. TATUM, L. A. and
KEHR, W. R.
Observations on factors affecting seed-set with inbred strains of dent corn.
Agron. J. 1951 : 43 : 270-75.

Varietal differences in the susceptibility of maize to wilting in the silks and tassels, or in the ability to translocate water to the reproductive organs with sufficient rapidity during drought, are thought to influence the percentage seed set. During experiments with dent maize inbreds at the Kansas Agricultural Experiment Station, a close relationship was found between the success of pollination and the temperatures and relative humidities prevailing at the time of pollination.

2642. ANGULO-BUSQUETS, M.
Ensayos con híbridos americanos de maíz en 1950. (Trials with
American hybrid maize in 1950).
An. Estac. Exp. Aula Dei 1951 : 2 : 204-09.

Data are provided on the vegetative period, susceptibility to the European corn borer, degree to which the husk encloses the ear, amount of insect damage to the ear, and grain yield of the American maize hybrids introduced into Spain. In general, the yields of the hybrids were considerably above those of Spanish varieties, but the latter were less susceptible to corn borer.

2543. COSTA-RODRIGUES, L.
Tests on hybrid maize.
Agron. Lusitana 1949 : 11 : 223-40.

Data are presented concerning the performances of 79 inbred lines and 30 hybrids received from FAO for adaptability tests in Portugal. Although variation in the date of maturity was largely dependent on the local conditions it was decided that varieties with a maturation period of 110 to 115 or 115 to 120 days are desirable in the 11 counties cooperating in the tests. Those forms suited to each locality are listed. The hybrid 641 AA from Wisconsin has shown greatest adaptability; attempts are being made to produce more seed of this variety and each of its parent inbred lines.

2644. SKAARE, S.
Nye fôrvekster. (New fodder crops).
Tidsskr. Norske Landbr. 1951 : No. 3-4 : 47-57.

The director of research at the Vidarshov seed farm discusses the merits of some of the newer forage crops, especially from the point of view of their value for silage in Norway, e.g. green maize, sweet lupin, marrow stem kale and the AIV or leafy turnip, popular in Finland. Some data are cited on yields and quality, including chemical composition.

2645. WIIDAKAS, W.
Corn hybrid and variety performance.
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1951 : 13 : 157-64.

Information is given on the performance of maize varieties and hybrids tested in different localities of North Dakota.

BARLEY

2646. MACKEY, J.
Neutron and X-ray experiments in barley.
Hereditas, Lund 1951 : 37 : 421-64.

Initial seedling growth was retarded after irradiating dry barley seed with X-rays and fast neutrons; the ability to survive was almost equal in X_1 and N_1 after comparable doses. At later stages, differences were observed in the frequency of cytological abnormalities,

plant fertility and rate of induced chlorophyll mutations in X_1 and N_1 . It is suggested that the physiologically toxic effects of X-rays combine with the direct influence of irradiation on the chromosomes to produce sterile individuals or a high mortality rate; such physiological effects are absent during neutron treatment. A higher frequency of chromosomal aberrations in X_1 than in N_1 is correlated with the different spatial distribution of ionization in tissues after X-ray and neutron irradiation.

When presoaked seeds were treated similarly, the results were comparable with those above.

The frequency and nature of induced chlorophyll mutations in X_2 and N_2 corresponded with those observed in X_1 and N_1 .

2647. ULONSKA, E.

Methodische Fragen in der Pflanzenzüchtung unter besonderer Berücksichtigung der Gerstenzüchtung. (**Questions of technique in plant breeding, with particular reference to barley breeding**).

Landw. Jb. Bayern 1949 : 26 : No. 11/12 : 99-107.

Mention is made of the results of the early selection work in barley, some of which, such as the Eglfinger Hado barley produced at Weißenstephan in 1907, are still to be found in cultivation. One of the earliest Weißenstephan hybrids, Isaria, from a cross of the hygrophytic Bavaria with the xerophytic Danubia, is still distinguished by its adaptation to widely varying conditions of soil and climate. Newer varieties have surpassed these old-time barleys mainly because they are more adapted to intensive cultivation: they respond to high doses of manure, have stronger straw, are more disease resistant and many are higher in quality. Resistance to races A, B and D of *Erysiphe graminis* was achieved by crossing Pflugs Intensiv with a mildew-resistant Dalmatian barley from Ragusa; by back-crossing it was possible to combine mildew resistance with satisfactory standing capacity and winter hardiness. Resistance to race 23 of yellow rust was introduced from Isaria; resistance to brown and black rust was added after a long series of back-crosses. Further improvements will undoubtedly be achieved by a continuation of the same technique but the process will be very slow, and quicker methods such as induction of mutations are also being applied. In this way a mildew-resistant form of Haisa barley, otherwise identical with the original Haisa, has been produced.

2648. SMITH, L.

Cytology and genetics of barley.

Bot. Rev. 1951 : 17 : 1-51, 133-202, 285-355.

A comprehensive review of literature on the genetics and cytology of barley is presented. The bibliography comprises 915 references and addenda.

2649. JOHNSTON, T. H. and

SCHLEHUBER, A. M.

Harbine. A new combine barley.

Bull. Okla. Agric. Exp. Sta. 1951 : No. B-367 : Pp. 14.

A detailed description is given of Harbine (cf. Abst. 1023), developed by the late H. V. Harlan from a composite cross involving Winter Club, Everest, Golden Pheasant, Orel, Esaw, Nakano Wase, Trebi, Tennessee Winter 66 and 52, Tennessee Beardless 6, Smooth Awn, Wisconsin Winter and a variety merely designated as Row 3.

2650. COVAS, G. and

SCHNACK, B.

Hibridación interespecífica en "Hordeum". II. *H. compressum* x *H. californicum*. (**Interspecific hybridization in *Hordeum*. II. *H. compressum* x *H. californicum***).

Rev. Argent. Agron. 1951 : 18 : 13-17.

The former is an Argentine and the latter a North American species. The hybrid was

more vigorous than either of the parents but completely sterile. Various meiotic irregularities were observed in the hybrids although both parental species had $2n = 14$ chromosomes. In an allotetraploid obtained from the hybrid, seed was set in 80% of the central florets.

2651. FORLANI, R.
Casi di partenocarpia in *Hordeum*. (**Cases of parthenocarp in *Hordeum***).

Genetica Agraria, Roma 1950 : 2 : 193-98.

Using a method of emasculation in which the glumes are cut away on a level with the tops of the anthers, a series of crosses were made between various cultivated barleys and *Hordeum murinum*. When *H. vulgare* ($n = 7$) was used as the pistillate parent no set was obtained except in one instance, when a parthenocarpic seed resulted. When *H. murinum* ($n = 14$) was the pistillate parent, the caryopsis developed apparently normally, but later the seed became wrinkled and proved to be composed only of bran, lacking germ, starch cells and aleurone. It seems that seed sets only when the pistillate parent has the lower chromosome number, and even then the resulting seeds are parthenocarpic. The pericarp of such seeds was thicker than normal, $26-52\mu$ as compared with $6-8\mu$.

2652. SCHIEMANN, E.
Neue Gerstenformen aus Ost-Tibet und ein weiterer Fund von *Hordeum agriocrithon* Åberg. (**New barley forms from Eastern Tibet and a further find of *H. agriocrithon* Åberg**).

Ber. dtsch. bot. Ges. 1951 : 64 : 56-68.

In an analysis of samples of crop cereals, collected by the British Museum expedition to Eastern Tibet, the writer gives her interpretation of the occurrence, among 6-rowed awned naked barleys, of the following forms: (1) awned forms of 6-rowed *H. agriocrithon* with a brittle rachis; (2) a constant *intermedium* barley with a brittle rachis and (3) another such form segregating for the *intermedium* character and for ear and grain colour; and (4) a constant *intermedium* barley with tough rachis.

A single awned barley grain discovered in a wheat sample yielded a plant of *H. agriocrithon*, thus representing a new find of that species. Moreover, the occurrence of *H. agriocrithon* as a weed supports the view that it occurs as a wild form.

From nine other awned barley grains in three different samples of naked barley six plants of the *intermedium* type were raised; four were as brittle as *H. agriocrithon* and *H. spontaneum*. Such wild forms, unknown hitherto, are regarded as phylogenetically early mutants from *H. agriocrithon*.

The remaining two plants, with tough rachis, are thought to have resulted from a cross of the two primary mutants of *H. agriocrithon*, 6-rowed cultivated barley x brittle *intermedium*. Since now only naked barleys are grown in Tibet, the two mutations in the awned wild barley must have occurred before the mutation to naked; subsequently the naked barleys must have completely supplanted the awned barleys in Tibet.

2653. TJIO, J. H. and
HAGBERG, A.
Cytological studies on some X-ray mutants of barley.
An. Estac. Exp. Aula Dei 1951 : 2 : 149-67.

Data are given on the meiosis, mitosis and caryotypes of (1) the variety Golden, (2) the X-ray induced mutants of Golden known as *erectoides* 1 and *erectoides* 7, and (3) the hybrid *erectoides* 7 x Golden and its reciprocal. The oxyquinoline method gave excellent results in studying the somatic chromosomes (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2070). The mutants were found to be homozygous for reciprocal translocations in comparison with the parent variety. The two mutations appeared to be completely linked with their respective points of translocation. In the case of *erectoides* 7 it was possible to locate the

translocation point in the somatic chromosomes, because the interchanged segments caused differences in size compared with the relevant chromosomes of Golden; the translocation point was found to be situated on the proximal part of the short arm of chromosome V and on the long arm of chromosome I between the secondary constriction and terminal end (cf. Abst. 329). The karyotype of *erectoides* 1 did not exhibit any marked differences from that of the parent variety; possible ways in which the translocation point of this mutant may be located in further investigations are discussed. The value of mutants involving translocations in mapping the chromosomes of barley by cytological analysis is discussed.

2654. SUNESON, C. A.

Male-sterile facilitated synthetic hybrid barley.

Agron. J. 1951 : 43 : 234-36.

Male sterility, dependent upon the factor pair *msms*, provides a means of exploiting hybrid vigour. Male sterile plants are completely self sterile and are characterized by partially open glumes exposing stigmas which are receptive to pollen for 6 to 10 days. The value of composite hybrid populations is being investigated at the University of California. In such populations the male sterile portion of each generation produces the hybrid seed, and the proportion of self fertile, pollen producing plants must be kept relatively high. Synthetic hybrids have been under test since 1945 but have generally given yields merely equal to those of established varieties. Since a synthetic F_4 population segregating for *msms* plants is composed of F_1 , F_2 and F_4 stocks its total expression of heterosis should be roughly equivalent to that of an F_2 generation; the experimental data support this assumption. Under the conditions of the tests the full benefits of heterosis were not realized, because poor pollen extrusion and dispersal resulted in seed production in only 25 to 49% of the male sterile flowers. This poor seed set in turn minimized the effect of grading for seed size to increase the proportion of F_1 hybrid seed sown. Possibly better pollen disseminators may be discovered. The weather conditions favourable for pollen extrusion also result in wider opening of the glumes of the male sterile plants for pollen reception.

2655. LITZENBERGER, S. C. and

GREEN, J. M.

Inheritance of awns in barley.

Agron. J. 1951 : 43 : 117-23.

The inheritance of awns and the linkage relationships of the genes conditioning awn production with those controlling certain characters of the seedling, spike and seed were analysed in crosses involving nine barley varieties.

The factor Lr_1 for the development of awns on fertile lateral spikelets exerted an additive effect upon the development of lateral awns and length of central awns; the genotypes lr_1lr_1 , Lr_1lr_1 and Lr_1Lr_1 resulted in no intermediate and long lateral awns, but in short, intermediate and long central awns, respectively.

The factors Lk_4 and Lk_5 only influenced awn length. In the presence of Lr_1 , these two genes resulted in fully long awned segregates; in the absence of Lr_1 they gave rise to the centrally short type of awn. In the presence of Lr_1 , Lk_4 resulted in the fully short type of awn; but in the absence of Lr_1 , Lk_4 produced completely awnless segregates. In the absence of Lr_1 , genotypes with Lk_4 and Lk_5 and with Lk_5 only were indistinguishable. The factor Lk_4 is therefore dependent on the presence of Lr_1 for expression. Both Lk_4 and Lk_5 were inherited independently of Lr_1 . The linkage relationships of Lk_4 and Lk_5 have not been sufficiently well established to place them definitely in linkage groups.

The view is expressed that awn inheritance in barley is probably dependent on fewer genes than previous investigations have suggested. Uncertainty of classification on the basis of awn length and failure to determine interactions among nonallelic factors may have resulted in too high estimates of the number of genes concerned. It is further suggested that a given amount of space devoted to several small F_2 progenies yields more information than the same space allotted to one large F_2 progeny.

2656. KUPERMAN, F. M.
(**The development of multifloral spikelets in barley**).
Doklady Vsesojuz. Akad. Sel'sk. Nauk im. V.I. Lenina (Proc. Lenin
Acad. Agric. Sci. USSR) 1950 : No. 10 : 13-15. [Russian].

Laboratory trials and field observations at Moscow State University and elsewhere in the USSR showed that barleys can be induced to produce multifloral spikelets and branching ears (cf. Abst. 1030). Breeding barley for spikelets bearing more than one floret is advocated.

Mention is made of 181 branching ears of an unnamed barley variety selected at the Kabarda Breeding Station in 1940. The seed was planted in 1941 and gave 12,000 plants, 21.5% of which had multifloral spikelets.

2657. NASONOVA, E. V.
(**Branching barleys**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :
p. 77. [Russian].

Breeding barleys for branching ear has been begun at the Krasnovodopadskaja State Breeding Station, Kazakhstan. The initial material consisted of several individuals of Nutans 17 which developed the branching habit when grown upon good soils in varietal trials conducted in 1949. Nutans 17 is a spring barley variety originating from the Katta-Kurgan Research Station.

2658.
**Annual Report of the Council of the Institute of Brewing for the
year ended 31st December, 1950.**
J. Inst. Brew. 1951 : 48 : 69-105.

Brief reports are included of the following: barley trials carried out in 1950 by the National Institute of Agricultural Botany; work on hop breeding, genetics and variety testing at Wye College; investigations on *Verticillium* wilt and virus diseases of the hop, including breeding for resistance to *Verticillium*, at East Malling (cf. Abst. 2943); and the results of the Challenge Cups competition with respect to new varieties of hops from the 1949 crop (cf. Abst. 1261). Reference is also made to proposed work on the nomenclature and registration of barley varieties; and a scheme for international coordination in trials of malting barley varieties. As a first step in the latter scheme, arrangements have been made for the testing of Kenia in eight European countries.

2659.
**Moore barley adapted to some United States areas, Midwest
Barley Improvement Association report shows.**
Canad. Grain. J. 1951 : 6 : No. 10 : p. 21.

The following barleys are on the list of varieties approved for malting and brewing by the Malt Research Institute, Madison, Wisc.: Kindred (L), Montcalm, Moore, Bay, Manchuria, OAC 21, Oderbrucker, Odessa and Wisconsin 38. Recommendations regarding the areas of adaptation of the approved varieties have been made by the Midwest Barley Improvement Association. Moore is not included on the list of varieties recommended for western Canada.

2660.
Industrial evaluation of five varieties of barley grown in 1948.
Publ. Malt Res. Inst. Wisc. 1950 : No. 9 : Pp. 16.
Industrial evaluation of four varieties of barley grown in 1949.
Ibid. 1951 : No. 10 : Pp. 17.

Malting and brewing trials carried out on Kindred, Montcalm and Moore and the control varieties Wisconsin 38 and OAC 21 are reported in detail. As a result of the tests in 1949

and two previous years, Kindred, Moore and Montcalm have been approved as malting and brewing barleys. Other varieties classed as suitable for malting and brewing comprise Oderbrucker, Manchuria, Odessa, OAC 21 (blue aleurone), Bay and Wisconsin 38 (cf. Abst. 2659).

2661. YAMAMOTO, S.
(Report of investigations on ears with sterile grains in malting barley).

Seibutsugaku Gyoseki (Biol. Results) 1942 : 1 : 1-10. [Japanese].

In this investigation into the causes of spikelet sterility in Japanese malting barleys, varietal differences in its incidence are described. It is noted that the F_1 of the cross Hakuta 2 x Indian barley shows a higher frequency of sterile spikelets than either parent.

2662. HUNTLEY, D. N.
***Erysiphe graminis* in barley. I. Effect of time of infection and method of planting on degree of infestation; II. Mode of inheritance of resistance.**

Iowa St. Coll. J. Sci. 1951 : 25 : 252-53.

Information is given on the effects of mildew infection upon the yield and kernel size of barley varieties inoculated at different stages of development. Mildew had no measurable effect upon tillering, sterile spikelets, heading date, maturity date, plant height or protein content. Spacing had no significant effect upon mildew infection. Inoculating with race 9 of *E. graminis* var. *Hordei*, it was found that the barleys Psaknon, Sel. 175 and Kwan each possess a dominant gene for resistance. Duplex carries two dominant genes for resistance to race 9, linked with a cross over percentage of 35.82. Stephan also possesses a single dominant gene for resistance, differing from those found in Duplex and the other varieties mentioned.

2663. SCHALLER, C. W.
The effect of mildew and scald infection on yield and quality of barley.

Agron. J. 1951 : 43 : 183-88.

Information is given on the effect of powdery mildew and *Rhynchosporium* scald on the yield, kernel number per spike and kernel weight of Atlas and Atlas 46 grown during the three year period 1947 to 1949 at several centres in California.

2664. McBEAN, D. S. and
 PLATT, A. W.
Differential damage to barley varieties by grasshoppers.

Sci. Agric. 1951 : 31 : 162-75.

About 40 barley varieties and several hybrids were grown in replicated plots at nine stations in Western Canada between 1944 and 1947 and subjected to damage by naturally occurring populations of grasshoppers. The mean percentage of damage measured by the number of dropped heads, the range of damage between varieties and the statistical significance of varietal differences are presented in tabular form. Although all varieties were equally damaged as they emerged from the ground, during the adult plant stage wide differences in susceptibility were observed; damage ranged from 22 to 84% for Lansdale and Canadian Thorpe respectively. Crosses between Prospect (moderately resistant) and Hannchen (susceptible) produced progeny of varied reaction; most hybrids were intermediate between the two parents. Insufficient data have been obtained for an analysis of the genetic determinants concerned.

Positive correlations were found between extent of grasshopper damage and date of heading; early maturing varieties appeared to be more resistant than those of later

maturity. These correlations were found to be dependent on the protein content of the straw; as the plant matures the protein content diminishes. Since grasshoppers prefer plants of high protein content the differences in varietal reaction may be the result of recording data concerning all varieties at the same date, when varieties differed in stage of maturity.

2665. ARONOVITCH, I. and
KOSTRINSKY, Y.
(Results of barley variety trials).
Ktavim, Rehovot 1950 : 1 : 81-82, 331-52. [Hebrew].

Varietal trials were carried out on the barleys BMC, F 1, F 48, M 38, Gvati and Tunisian in Palestine during the period 1939 to 1948. Varietal recommendations for the different districts are given.

2666. Société d'Encouragement de la Culture des Orges de Brasserie et des
Houblons en France. SECOBRAH. Rapports sur la campagne 1949.
**(Society for the Promotion of the Cultivation of Malting Barleys
and of Hops in France. SECOBRAH. Reports on the 1949
season).**
Paris 1949 : Pp. 69.

This progress report (cf. Abst. 1041) embodies further information, mainly in the form of graphs and tables, on the results of various types of winter and spring barley trials conducted in many parts of France in 1949. Studies of vegetation and manuring experiments occupy a large part of the report.

2667. BUCHLI, M.
Heutiger Stand der Sortenfrage im Futtergetreidebau. **(The position
today regarding the question of varieties in fodder cereal
growing).**
Schweiz. landw. Z. Die Grüne 1951 : 79 : 269-79.

The characteristics and performances of the varieties of barley and oats usually grown in Switzerland for fodder are described. Since 1947 winter barleys from Holland, Sweden and Germany have been undergoing tests. One of these barleys, the promising new 4-rowed variety Gembloux 456, has been put forward for inclusion in the collection of recommended varieties; it has also been used in crosses with Riniker with the aim of obtaining an early, high yielding variety resistant to lodging.

In Switzerland the spring barleys from southern Germany have proved more resistant to mildew than the high yielding Swedish, Danish and French varieties.

As regards oats, the difficulties of combining, by hybridization, resistance to lodging with resistance to the frit fly are indicated. Breeding material from more northerly countries with a maritime climate is not always so suitable for the continental alpine climate of Switzerland where the problem of frit fly resistance is especially important. In tests made in 1949-50 with seven varieties of oats, Flämingstreue and Soldanella showed higher resistance to frit fly than the other varieties. There is no correlation between early ripening and susceptibility to attack by the frit fly. A correlation has, however, been found between resistance to the frit fly and very early development of the seedlings and luxuriance of vegetative growth in the young stage. Thus, for example, Flämingstreue and Fläminggold are both noted for their resistance to the fly though they are not early varieties, whereas the early ripening variety Adlikerhafer is not resistant to frit fly, possibly, partly owing to the relatively low tillering capacity and the rather belated development of the seedlings.

2668. KRISHNA RAO, P.
Annual Report of the Millet Breeding Station, Coimbatore, for the year 1947-48 : Pp. 26.

Eleusine coracana

Ragi breeding is described. Co. 2, one of the four improved strains now being distributed, has been crossed with suitable types to improve its straw yield. Pigmented strains appear to be more resistant to *Piricularia* than non-pigmented ones.

Pennisetum typhoideum

The cumbu strains Co. 1, Co. 2 and Co. 3 have become popular among farmers; four other improved strains have reached the stage of final trial. The use of single and double crosses as a means of exploiting hybrid vigour is being studied, with encouraging results. Under natural conditions 50 to 60% cross pollination occurs; under controlled conditions, this amount can be considerably increased. Simultaneous flowering of the male and female parents used for producing hybrid seed can be effected by sowing the male parents 4 to 5 days earlier.

Selections of progenies derived from X-ray treated seeds have not been consistent in their performance. Further trials will not therefore be made; X-350, which has significantly outyielded Co. 1, will however be retained as a parent for the production of hybrid seed.

Setaria italica

Seed distribution of the improved tenai strains Co. 1, Co. 2 and Co. 3 continued. In general, the selections tested showed no superiority in yield over the above three strains. Selection of crosses made to combine short maturity period and high yield is in progress. Resistance to *Uromyces* rust is receiving attention.

Sorghum

Selection and hybridization of grain and fodder strains are in progress. The types AS 4003 (Bonganhilo) from Africa and AS 4693 (Bilichigan) from Bombay have been used as *Striga* resistant parents, with promising results. Breeding material with resistance to the pest *Calocoris angustatus* is being sought. An analysis of hydrocyanic acid content has been carried out on a wide range of botanical types. Only one, AS 3487 (*Sorghum cernuum*), contained a nonlethal content, below 0.02%.

Linkage relationships between the genes for sheath and node colour are under investigation.

Other millets

Improved strains of varagu (*Paspalum scrobiculatum*), samai (*Panicum miliare*), panivaragu (*Panicum miliaceum*) and kudiraivali (*Echinochloa frumentacea*) have been developed, seed of which is being distributed.

2669.

New Sudangrass will reduce livestock losses due to prussic acid.

Crops and Soils 1951 : 3 : No. 7 : p. 30.

Piper, a new variety of sudan grass developed at the Wisconsin Agricultural Experiment Station by selection for low prussic acid content, is to be released for seed production during 1951. The plants retain their green colour late in the autumn, producing high yields of forage and seed.

2670. VARENICA, E. T.

(Descriptions of several varieties of *Setaria*).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 6 : 38-41. [Russian].

To facilitate work with *Setaria* varieties introduced to the USSR from China (cf. Abst. 1045), descriptions are given of a series of Chinese varieties.

Of the varieties described, Janjczin 811 (Yangtsêng 811) is remarkable for its grain quality and resistance to *Sclerospora graminicola*, Huanung 4 [Chinese Farmer 4] for its resistance to lodging, Jui-gu (Yüku) [Imperial Grain] for its large grain, and Kanhangu (K'anghanku) [Drought Resistant Grain] for its resistance to drought. Bodiczu 2 (Potitzü 2) [Moderate

in Requirements 2] is as moderate in its requirements as Bodiczu but surpasses it in earliness and has larger grain.

2671. GARBER, E. D. and
SNYDER, L. A.

Cytotaxonomic studies in the genus *Sorghum*. II. Two new species from Australia.

Madroño 1951 : 11 : 6-10.

Two new Australian species of *Sorghum* are described: *S. australiense* and *S. matarankense*, the former having 20 chromosomes and the latter 10. Meiosis is described for the two species; in *S. australiense*, varying numbers of 4-chromosome rings were observed.

2672.

Sorghum—a proud popper.

Sth. Seedsman 1951 : 14 : No. 4 : p. 26.

The characteristics of pop-sorghum, a new variety of grain sorghum with popping qualities similar to popcorn, developed at the Texas Agricultural Experiment Station by hybridization between the introduced varieties Peti mil (petit mil = little millet) and Shallu (cf. Abst. 1048) are described.

2673.

Sorghum breeding experiments.

New Commonwealth 1951 : 21 : p. 704.

A note is given on the programme of breeding sorghum varieties suitable for mechanized farming methods in Nigeria. J. O. Webster, the American expert on grain crops, is to spend several months in Nigeria to study the possibilities of cultivating American varieties and of crossing American and local sorghums. The visit is being sponsored by the Economic Cooperation Administration and the Colonial Office.

2674. TULLIS, E. C.

***Fusarium moniliforme*, the cause of a stalk rot of sorghum in Texas.**

Phytopathology 1951 : 41 : 529-35.

Resistance to *F. moniliforme* has been found in Texas Blackhull Kafir, Feterita (FC 811), Extra Early Sumac and several other varieties resistant to charcoal rot (*Macrophomina Phaseoli*).

2675. DEODIKAR, G. B.

***Sorghum versicolor*, Anderss—a species highly resistant to *Striga*.**

Curr. Sci. 1951 : 20 : 135-36.

S. versicolor proved to be highly resistant to *Striga* spp. in three tests of *Sorghum* species and varieties. Limited data suggest that *S. purpureosericeum* and *S. nitidum* are also highly resistant. These three species belong to the section *Para-Sorghum* ($2n = 10$). Sorghums of this section may therefore be valuable in breeding for *Striga* resistance, provided that the difficulties in effecting hybridization with *Eu-Sorghum* species ($2n = 20$) can be surmounted.

RICE

2676. BALASUNDARAM, M. L.

Annual Report of the Rice Research Station, Buchireddipalem (Nellore district), for the year 1947-48 : Pp. 11.

Rice selection at several centres in the Nellore district, Madras, is reported. In view of their high degree of resistance to blast the strains Molakolukulu 2555 and 2202 are to be

released under the names Buchireddipalem 1 (Sanna Molakolukulu) and Buchireddipalem 2 (Budda Molakolukulu) respectively. Further selections of the cross between Iswarikorra and Pishanam 1283 were made with the aim of developing strains for growing in the intermediate season but with grain of better quality than Iswarikorra, the chief variety at present used in this season.

2677. VISWANADHAM, K. B. and
VENKATANARASINGA RAO, M. B.
**Annual Report of the Paddy Breeding Station, Coimbatore, for
the year 1947-48 : Pp. 17.**

Local rice varieties are being improved by pure line selection. In breeding for blast resistance, several hybrids between strains having different periods of maturity and the resistant strain Co. 4 are being studied. Two resistant strains, 3840 and 3912, derived from ADT 10 x Co. 4, have already been released under the names Co. 26 Blast resistant Nellore samba (main crop) and Co. 25 Blast resistant Sirumani, respectively. In years of severe incidence of blast these strains produce up to ten times the yield of ADT 10, the most popular variety of the Tanjore district.

Numerous other hybrids are being selected with various objectives. In breeding for drought resistance, Co. 13 x T 406, Co. 13 x 1608, and crosses between wild rice and short and long duration strains are being evaluated. The economically unsatisfactory type Tellathoka vadlu shows the highest degree of resistance to salinity; families from crosses between this type and Co. and other strains are being selected. In breeding for flood resistance and high yielding ability, material from crosses of Kavinginpothala with Rakakayama and culture 10783 shows promise.

Disappointing results have been obtained from trials of the drought resistant Russian variety Krasnodar, reputed to grow on the dry steppes and ripen a month earlier than other varieties without irrigation.

In work on the induction of mutations, combinations of chemical and physical agents are under test. Exposure to ultraviolet light for 10 minutes accompanying acenaphthene treatment did not produce any marked mutagenic effect; moderate dosages of X-rays are to be substituted. The mutagenic effect of benzene vapour upon emerging panicles of Co. 13 is being investigated.

Sterile plants of Muthusamba have a chromosome number of $2n = 22$ in contrast to the normal $2n = 24$. A search is being made for other chromosome deficient plants with a view to using them in linkage studies.

2678. CADA, E.
**Studies on varietal crosses of upland rice. I. Genetic behavior of
certain characters.**
Philipp. J. Agric. 1949 : 14 : 357-86.

An account is given of rice hybridization carried out in the Philippines to (a) determine some of the genetical factors controlling characters inherited in upland rice, (b) combine the desirable qualities of the American variety Fortuna with selected native varieties, and (c) determine the best combination for selection from different crosses. The characters analysed included colour of the leaf sheath, peduncle and grain; glutinous or nonglutinous nature of the endosperm; degree of hairiness of the leaf blade and inner glumes; date of maturity; height of plant; number of culms; number of grains per panicle; yield per plant; and reaction to streak and leaf gall diseases.

Based on the mean yield per plant, the most promising crosses with Fortuna appeared to be with the native varieties C45-2 and Dinalaga.

2679. HARA, S.
**(Genetical studies on chlorophyll characters in rice. I. The
occurrence and inheritance of various *chlorina* types).**
Jap. J. Genet. 1944 : 20 : 15-17. [Japanese].

Four recessive genes, ch_I , ch_{II} , ch_{III} and ch_{IV} , responsible for the development of *chlorina*

pigmentation are described. Chlorophyll development is normal when either Ch_I and Ch_{II} , or Ch_{II} and Ch_{III} occur together.

2680. HARA, S.
(Genetical studies on chlorophyll characters in rice. II. The occurrence and inheritance of *xantha* types).
 Jap. J. Genet. 1946 : 21 : 1-9. [Japanese].

Four recessive *xantha* genes are described, xa_I to xa_{IV} . Other *xantha* genes were also studied and a table is given of the segregation ratios obtained in crosses involving them. A special investigation was made of the polyhybrid segregation ratios of the genes xa_I , xa_{II} and *chlorina* gene ch_{III} in one case, and of xa_I , xa_{II} and ch_I in the other. The dominant allelomorphs of *xantha* and *chlorina* genes must be present together for normal chlorophyll pigmentation.

2681. HARA, S.
(Genetical studies on chlorophyll characters in rice. III. Occurrence and inheritance of albino types).
 Jap. J. Genet. 1946 : 21 : 15-21. [Japanese].

Data are provided on the segregation ratios observed in numerous crosses involving albino types. A number of different recessive albino genes occur. Segregation ratios were also studied in crosses involving an albino gene and the *chlorina* gene ch_{II} , albino and ch_I , and albino and the *xantha* genes xa_I , xa_{II} . For normal chlorophyll pigmentation, albino, *chlorina* and *xantha* genes must be replaced by their dominant normal type allelomorphs.

2682. MORINAGA, T.,
 NAGAMATU [NAGAMATSU], T. and
 KAWAHARA, E.
(The linkage between the gene for coloration with phenol in rice and some other genes).
 Jap. J. Genet. 1943 : 19 : 206-08. [Japanese].

Gene *PH* is responsible for dark purple coloration of the grain and husk of rice after treatment with phenol. It is linked with genes *lg* (liguleless), *AP* (apiculus coloration) and *Rbe* (glume coloration), the respective cross-over values being 5-7, 19 and 17%.

2683. NAGAMATU [NAGAMATSU], T.
(Studies on the geographical differentiation of cultivated rice. II. Regional classification of cultivated rice according to its anthocyanins).
 Jap. J. Genet. 1943 : 19 : 249-57. [Japanese].

Tables are presented summarizing the geographical distribution of the different types of pigmentation encountered in the world collection of rices at Kyushu. The pigmentation categories are subdivided according to whether the varieties are glutinous or nonglutinous.

2684. **Improvement of paddy in Travancore.**
 Indian Fmg 1950 : 11 : p. 238.

At the Paddy Breeding Station, Monkomp, a pure line, MO 1, has been selected from Chetti Virippu, a variety possessing resistance to acidity and salinity; the new strain outyields the original variety by 20%. Strain MO 2 outyields the local variety Kallada Samba from which it was selected by 22%. At the Adoor Station improved strains have been developed from local varieties which show from 16 to 28% increase in yield.

2685. KRISHNASWAMI, V.

Annual Report of the Rice Research Station. Ambasamudram, for the year 1947-48 : Pp. 16.

The results of trials on selections from rice varieties and hybrids at Ambasamudram, Madras, are summarized.

2686. PORTÈRES, R.

Primitivité et progrès dans l'évolution au sein du genre *Oryza*. (Primitiveness and progress in evolution within the genus *Oryza*).

Rev. Bot. Appl. 1950 : 30 : 603-10.

In this comparative study of *Oryza* species from the standpoint of evolution, it is pointed out that a species may be highly evolved in one structure and highly primitive in another character: there is no synchronization in modifications of organs or portions of organs.

The writer discusses 12 chosen characteristics of the panicle, spikelet, floret, and the ecological and biological behaviour of the rice plant, with reference to their significance as indications of primitiveness or evolution. On the assumption that primitive features are dominant to the more evolved characters, a table has been drawn up showing the evolutionary status of 21 different species of *Oryza*, as revealed by the proportion of the dominant primitive characters and of the recessive characters present in each species.

The effects of natural evolution and of evolution in cultivated species under domestication are compared. The section *Sativa* is the most primitive of the genus.

2687. LUONG, D. C.

A newly devised colchicine method for inducing polyploidy in rice.

Bot. Gaz. 1951 : 112 : 327-29.

Hulled or unhulled seeds are germinated in Petri dishes. When the shoot reaches a length of 3-5 mm., it is split longitudinally from top to base. A small cotton ball or, preferably, blotting paper cut into very small squares is inserted into the base of the split. The cotton or blotting paper is then wetted with colchicine solution. Treated seedlings are then transferred to a larger dish to secure the optimum degree of humidity. A second application of colchicine is made the following day; 24 hours later the cotton or blotting paper is removed; finally, the plants are washed and transplanted into the seedling bed. The most suitable concentration of colchicine appears to be 0.05 to 0.1%, with two applications. Panicles with tetraploid tissues often fail to emerge completely from the sheaths. Tetraploid spikelets are larger than diploid ones, with coarser hairs and longer awns.

2688. NAGAMATU [NAGAMATSU], T.

(Studies on the geographical differentiation of cultivated rice. I. On ecotypic differentiation in respect of capacity for germination).

Jap. J. Genet. 1943 : 19 : 47-56. [Japanese].

Some 300 rice varieties were tested in Japan for rapidity of germination. Varieties from Japan, Korea and Italy germinated most quickly, in contrast to the slowly germinating tropical varieties. An intermediate speed of germination was observed in varieties from China and the USA; Russian varieties ranged from very early to very late.

2689. SYAKUDO [SHAKUDO], K.

[Studies on quantitative inheritance. II. A. Rice. (b) Studies on the inheritance of and quantitative function of the genes determining culm length. 1. On the quantitative function of the gene H_1].

Jap. J. Genet. 1946 : 21 : p. 26. [Japanese].

The inheritance of the quantitative character culm length was studied in the cross Mitsuryu x Kawachiseki [Kawachi Red]. The extent to which the gene H_1 affects culm length is calculated.

2690. NAGAO, S. and
TAKAHASHI, M.
(Studies on the genetical analysis of the pigmentation of the rice inflorescence).
Jap. J. Genet. 1946 : 21: 22-24. [Japanese].

From a study of a series of crosses between Japanese rice varieties, the authors have derived the following genotypes for the pigmentation of the flower: blackish red purple spikelets, $C^{Br}R_pS_p$; pansy purple or burnt lake spikelets, $C^{Bp}R_pS_p$; blackish red purple coloration confined to the apiculi and empty glumes, $C^{Br}r_pS_p$; pansy purple or burnt lake apiculi and empty glumes, $C^{Bp}r_pS_p$; rose red apiculi and empty glumes, $C^{Br}R_pS_p$ and $C^{Br}r_pS_p$; dark tawny spikelets, $C^{Br}R_pS_p$; pale tawny spikelets, $C^{Bp}R_pS_p$; tawny coloration confined to the apiculi and empty glumes, $C^{Br}r_pS_p$ and $C^{Bp}r_pS_p$; and green spikelets, $C^{Br}R_pS_p$, $C^{Br}r_pS_p$ and plants carrying the recessive allelomorph c .

2691. SYAKUDO [SHAKUDO], K.
[Studies on quantitative inheritance. I. A. Rice. (a) Studies on the inheritance of and quantitative function of the genes determining ear length. 1. On the quantitative function of the gene P_1].
Jap. J. Genet. 1946 : 21 : p. 25. [Japanese].

The inheritance of the quantitative character ear length was studied in the cross Mitsuryu x Kawachiseki [Kawachi Red]. The extent to which the gene P_1 affects ear length is calculated.

2692. NAGAO, S. and
TAKAHASHI, M.
[The genetics of the reaction to staining with a solution of iodine in potassium iodide of unpolished rice grains. (Studies on rice hybridization, VII)].
Jap. J. Genet. 1944 : 20 : 133-35. [Japanese].

The behaviour in respect of the intensity of staining of the unpolished grains with iodine has been studied in the F_1 , F_2 and F_3 generations of the cross Banaro (strongly staining) x Sekimo [Red Hairy] (weakly staining). The later generations tended to be intermediate in their behaviour, suggesting that staining reaction is determined by a number of polymeric genes.

2693. HASHIOKA, Y.
Studies on the mechanism of prevalence of the rice blast disease in the tropics.
Tech. Bull. Taiwan Agric. Res. Inst. 1950 : No. 8 : Pp. 237.

A comprehensive investigation has been carried out on the environmental factors influencing the prevalence of blast (*Piricularia Oryzae*), on the occurrence of resistance among varieties in different latitudes, environmental factors and plant characters affecting blast resistance, and on the inheritance of reaction to the disease.

Varieties belonging to the temperate regions are inherently susceptible to leaf blast; most of the varieties native to tropical countries are resistant to leaf blast. In the case of blast affecting the ear necks and culm nodes, the tropical groups of varieties include a greater number of resistant rices than the temperate group, but no marked distinction can be made between the groups. The tropical varieties are much less affected by environmental conditions in their reaction to the disease than the temperate varieties. Inheritance of resistance depends upon two dominant genes. Occurrence of the disease is largely conditioned by four factors: (1) the effect of temperature upon the growth of the fungus; (2) the effect of temperature upon the rice plant; (3) the influence of plant age upon resistance; and (4) heritable reaction to the disease. In temperate areas, the chief factor is (1). In subtemperate regions, (1) and (3) are the most important influences. All four

factors are important in subtropical areas, while under tropical climatic conditions (3) and (4) constitute the chief factors. Therefore in the subtemperate and temperate regions the prevention of growth of the fungus is regarded as of major importance in control of the disease, whereas in subtropical and tropical countries increase in host resistance offers the most promising method of control. Problems of breeding for blast resistance are analysed. In Formosa, the moderately susceptible Horai varieties, i.e. temperate varieties adapted to tropical conditions, should be rendered more resistant, particularly with regard to leaf blast, by crossing with highly resistant tropical rices; the resistance of some tropical varieties of the *indica* type to blast infection of the ears and culm nodes should also be intensified by breeding. The possibilities of hybridization between less closely related varieties should be explored as a method of developing varieties for the Japanese lowland districts. Finally, physiological specialization of the blast fungus and the effects of environmental conditions upon varietal resistance are considered in relation to breeding.

2694. RAMANA, G. V.

Annual Report of the Agricultural Research Station, Pattukkottai, for the year 1947-48 : Pp. 19.

Trials of rice strains, including a test of blast resistant Coimbatore and other selections, are reported from the Pattukkottai Station, Madras.

OTHER CEREALS

2695. PORTÈRES, R.

Une céréale mineure cultivée dans l'Ouest Africain (*Brachiaria deflexa* C. E. Hubbard var. *sativa* nov. var.). [**A minor cereal cultivated in West Africa (*B. deflexa* C. E. Hubbard var. *sativa* nov. var.)**].

Agron. Trop. 1951 : 6 : 38-42.

This new variety of the wild *B. deflexa* was brought into cultivation at some unknown period at Fouta-Djallon near Labé. It has similarities with *B. ramosa* and is used to produce flour for cakes and fritters.

FORAGE GRASSES

2696. ROSEVEARE, G. M.

The international grassland congress and grassland societies.

Arch. Fitotéc. Uruguay 1950 : 4 : 217-19.

A brief note is given concerning the congresses in general and the fifth congress in particular, which was held in the Netherlands in 1949 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1682).

2697. CRIDER, F. J.

New plants for the new agriculture.

Soil Conserv., U.S. Dep. Agric. 1951 : 16 : 204-09.

The work of finding and testing valuable native selections of grasses and other plants, carried out by the Soil Conservation Service in the United States, is described.

2698. HESS, N.

Probleme der Futterpflanzenzüchtung. (Problems of fodder plant breeding).

Bodenkultur, Wien 1950 : 4 : 415-21.

In breeding forage grasses and other fodder plants selection should not be one-sided since a multiplicity of lines is an essential factor in reliability of yield. In the case of grasses

the aim should be to breed those types which grow well together, and here growth rhythm should be taken into account. Breeding for resistance to disease is important. Strains should also be tested in various climates and must have a wide ecological range of distribution.

Varieties of grasses and clovers from flat and hilly land tested at altitudes over 1500 metres have been found superior to alpine forms, so that the breeding of true alpine forms is not necessary.

Over 100 samples of red clover from different parts of Upper Austria are being tested. No markedly early clovers have been found amongst these samples and only a few late varieties, the majority being medium early. American red clover varieties had to be rejected owing to their susceptibility to mildew. The difficulties of breeding clovers for reliability of seed yield are mentioned. In breeding for a shorter corolla tube the possible relation of this character to dwarf growth must be remembered; it is suggested that a wider tube might be a more easily attainable aim.

2699. ÅBERG, E.
 Ensilageväxter—nya arter och framtida problem. (**Silage crops, new kinds and future problems**).
 Årsb. Svensk. Jordbr. Forsk. 1951 : 42-52.

Mechanization and other factors in Swedish agriculture tend to favour ensilage of herbage grasses and legumes, including red clover, lucerne, sweet lupin, soya beans, maize, leafy turnips and *Melilotus alba* instead of the root crops formerly used for silage. The importance of a study of new strains of herbage plants with reference to time of cutting and seed mixtures is exemplified by reference to the French strains of blue lucerne, stated to be originally of Flemish origin, though now derived from a local strain grown not far from Paris (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1719 and XXI, Abst. 1909); the best known are Du Puits and Ile de France.

The value of *M. alba* for silage lies in its rapid growth and abundant foliage in the earlier stages of development, but coumarin-free strains must be sought. Both annual and biennial strains occur.

2700. LITARDIÈRE, R. DE.
 Nombres chromosomiques de diverses graminées. (**Chromosome numbers of various Gramineae**).
 Bol. Soc. Broteriana 1950 : 24 : 2. A Sér. : 79-87.

Chromosome determinations are reported as follows: *Aeluropus littoralis*, $2n = 20$; *Oryzopsis paradoxa*, 24; *Coleanthus subtilis*, 14; *Agrostis castellana*, 28; *A. salmantica*, 14; *Avena decora*, *A. sedenensis* and *A. bromoides*, 14; *A. sempervirens*, 14 and 42; *A. pratensis*, 14 and 28; *Cutandia maritima*, *C. memphitica* and *C. divaricata*, 14; *Festuca ovina*, *F. amethystina*, *F. Borderei*, *F. paniculata*, and *F. pumila*, 14; *F. rubra*, 28; *Vulpia pyramidata* and *V. membranacea*, 14; *Catapodium tenellum*, *C. patens* and *C. loliaceum*, 14; and *Bromus commutatus* and *B. macrostachys*, 28.

2701. JONES, M. D. and
 BROWN, J. G.
Pollination cycles of some grasses in Oklahoma.
 Agron. J. 1951 : 43 : 218-22.

The time of day and number of days when the following plants shed pollen have been determined at the Oklahoma Agricultural Experiment Station in connexion with breeding work: *Panicum virgatum*, Johnson grass, the sweet corn Golden Cross Bantam, *Eragrostis curvula*, rye, smooth brome-grass, *Festuca elatior* var. *arundinacea*, *Cynodon Dactylon* and sorghum.

2702. LYSIKOV, V. N.

(The use of wild forage plants in Kirgizia).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 : 42-44. [Russian].

Breeding work with leguminous forage plants and grasses in Kirgizia involving introduction and trials of wild plants is reported. The following varieties originated from wild material.

Cocksfoot

Varieties 2 and 7, derived from local material, and varieties 4, 125 and 130, introduced from the USSR Forage Institute, have been selected and are being multiplied for trials.

Ryegrass

Variety Kirgizskii [Kirgizian] has proved suitable for mixed cultivation with lucerne, clover and grasses in the Čui Valley. Variety 41, also derived from local material, is still under trial.

Lucerne

Variety Dikaja 508 [Wild 508] has been selected from material introduced from the USSR Forage Institute and is being bulked for trials.

Clover

A late variety, Grigorjevskii, has given a good account of itself in the alpine districts of the Issyk-Kul'skaja province. A two-hay clover Frunzenskii has done well in the Čui valley when grown together with lucerne and grasses.

Sainfoin

A hardy, drought resistant, early population Bogarnyi [Rainfed] has been bred from Kirgizian *Onobrychis arenaria*. Another variety, 82, is being multiplied for further trials.

2703. VASILJČENKO, I. T.

(A conference of botanists and plant breeders).

Priroda (Nature) 1950 : No. 11 : 77-78. [Russian].

The use of wild forage plants and wild fruit trees in Mičurinite plant breeding was discussed at a conference of botanists and plant breeders held in Leningrad on 24 to 27 March 1950.

2704. SMITH, D. C. and
NIELSEN, E. L.

Comparisons of clonal isolations of *Poa pratensis* L. from good and poor pastures for vigor, variability and disease reactions.

Agron. J. 1951 : 43 : 214-18.

Vigorous types occurred in clonal progenies from poor pastures in Southern Wisconsin, although the types were somewhat less frequent than in the progenies derived from good pastures. Thus no definite relationship was found between biotypes in a given area and the operation of edaphic and climatic factors. Intensity of growing appeared to have little effect on the relative proportions of the biotypes for vigour. Clonal progenies from the various pastures differed significantly in the proportions of plants resistant and susceptible to powdery mildew and hay rust; these differences were not closely associated with soil type, available moisture or management.

2705. GORMAN, L. W.

Species and strains of pasture plants.

Grasslands Bull. 1951 : No. 4 : Pp. 16.

The relative performances of varieties of *Dactylis glomerata*, *Phleum pratense*, *Lolium perenne*, *Trifolium* spp., *Medicago* spp. and *Lotus* spp. in New Zealand during the past twenty years are summarized. It is emphasized that future improvements depend on undertaking adaptability trials of all the new strains available.

2706. MYERS, W. M.
Registration of varieties and strains of timothy (*Phleum pratense*, L.).
 Agron. J. 1951 : 43 : 240-41.

The recently registered timothy Itasca is a rank-growing variety adapted to Minnesota, of the same maturity as commercial timothy but superior in growth characters and habit. It is a synthetic composed of seven inbred lines.

2707. GORMAN, L. W.
Strains of timothy (*Phleum pratense* L.).
 N.Z. J. Sci. Tech. 1950 : 32 : Sect. A. : 1-15.

With the aim of obtaining material for hybridization, a wide range of strains of *Ph. pratense* originating in Canada, Great Britain, New Zealand, Sweden and USA have been grown at Palmerston, New Zealand. Based mainly on differences of growth habit and date of maturity, classification into three groups suitable for hay, pasture-hay and pasture has been possible. The pasture-hay types, which will either produce a good hay crop or persist under heavy grazing, are of greatest value in New Zealand.

Seed harvested within a well defined area in Southland, where timothy has been grown from local seed for many years, has produced plants intermediate between hay and pasture-hay types. It is suggested that ecological factors have led to intraspecific variation and evolution of a regional strain.

2708. UNDENÄS, S.
 Hammenhögs original Vanadistimotej. (**Hammenhög Vanadis timothy**).
 Medd. Gullåkers VäxtförädlAnst., Hammenhög 1945 : No. 2 : 28-30.

The origin, from a local Ostergötland strain, and the performance of Vanadis timothy in Swedish comparative trials with Gloria during 1936-44 are recorded. Its superiority in yield and abundant aftergrowth is noted in regard to both the first and second cuts. It exceeded Gloria by 21.5% in aftergrowth, and as it has also abundant foliage and shows good resistance to diseases, it can be recommended for widespread cultivation in southern and central Sweden.

2709. MYERS, W. M.
Registration of varieties and strains of Bermuda grass (*Cynodon dactylon* (L) Pers.).
 Agron. J. 1951 : 43 : p. 240.

The Bermuda grass Coastal has been registered; a detailed description of the variety has already appeared in another publication (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1010).

2710. MYERS, W. M.
Registration of varieties and strains of brome grass (*Bromus* spp.).
 Agron. J. 1951 : 43 : 237-38.

The varieties Bromar (*B. marginatus*) and Martin (*B. inermis*) have been registered. The former was first distributed in 1940 (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 982). The latter is a synthetic composed of 21 clonal lines selected from seed collected during 1936 in Martin county, Minn. The lines were selected for high forage yield and relative freedom from leaf diseases. In growth characteristics the synthetic appears to be intermediate between southern strains and Canadian Commercial.

2711. CARTER, J. F. and
AHLGREN, H. L.
**Forage yields and disease development of two varieties of smooth
brome grass, *Bromus inermis* Leyss., grown under various
conditions in the field.**
Agron. J. 1951 : 43 : 166-71.

The results included the observation that the variety Canadian was more susceptible to *Pseudomonas coronafaciens* var. *atropurpurea* than Parkland.

2712. AHLGREN, G. H. and
DOTZENKO, A.
Brome grass strain performance trials.
Bull. N.J. Agric. Exp. Sta. 1950 : No. 753 : Pp. 4.

The yields of 26 varieties of brome grass, tested in 1947 and 1948 at the New Jersey Experiment Station, were compared in order to assess the relative merits of varieties of northern and southern origin. In respect of adaptability to conditions in New Jersey, the varieties Elsberry, Achenbach and Lincoln, which are considered to be of southern origin, have shown superior vigour, particularly after the first cutting, and have out-yielded all other southern and northern forms.

2713. COOPER, J. P.
Day-length and head formation in the ryegrasses.
J. Brit. Grassland Soc. 1950 : 5 : 105-12.

The importance of knowing the day length and temperature requirements of any variety or strain before it is introduced to a different region is emphasized. The date of spikelet initiation varies between early and late flowering forms in a response to a critical value in respect of day length in conjunction with specific day length and temperature conditions during the winter. By transferring strains to latitudes where they experience different day length or temperature, the date of heading, time of maturity and other correlated characters are often changed.

2714. CORKILL, L.
**A comparison of methods of progeny testing for quantitative
characters in ryegrass (*Lolium* sp.).**
N.Z. J. Sci. Tech. 1950 : 32 : Sect. A. : No. 3 : 35-44.

Three systems of obtaining progeny for testing, namely, open pollination, diallel crossing and top-crossing to a common parent, were compared with respect to selection for leaf production in rye grass at Palmerston North, New Zealand. Open pollination and diallel crossing provided similar data in 90% of the comparisons; results for top-crossing were less consistent.

The efficiency and relative simplicity of the open pollination method for determining the breeding potentialities of a wide range of material are emphasized.

2715. HAWKINS, R. P.
**Investigations on local strains of herbage plants. I. Kent
Indigenous Perennial Ryegrass.**
J. Brit. Grassland Soc. 1950 : 5 : 141-56.

Data are presented from investigations at Cambridge, England, concerning variations between strains of Kent Indigenous perennial ryegrass, obtained from numerous parts of the United Kingdom, Denmark and New Zealand. Differences were recorded in respect of date of ear emergence, habit of growth, ratio of width of plant to height, barren tillers, weight of individual plants, amount of spring growth, relative persistency and percentage of fluorescent seed.

2716. MYERS, W. M.
Registration of varieties and strains of fescues (*Festuca* spp.).
Agron. J. 1951 : 43 : p. 237.

The turf variety Illahee (*F. rubra*), which originated as an introduction from England in 1937, has been registered. It shows better turf characters than other red fescue varieties. In plot tests at Beltsville, Md., Illahee was more tolerant of cold than the five varieties with which it was compared.

2717. KARPER, R. E.
Registration of sorghum varieties, VI.
Agron. J. 1951 : 43 : p. 243.

The variety Tift Sudan, developed by crossing Sudan grass and the sorgho Leoti and back-crossing the hybrid to Sudan grass, has been registered; seed was first distributed in 1942. Its chief advantage is a high degree of resistance to many of the common foliage diseases in the southern and eastern United States.

2718.
Kansas Sourless sorgho.
Seed World 1951 : 68 : No. 4 : p. 22.

Interest in Kansas Common as a forage crop has revived; this sorghum was introduced into the United States from Natal nearly 80 years ago. A selected strain was named Kansas Sourless by the US Department of Agriculture in 1949.

2719. HARLAN, J. R.
New grasses for old ranges.
J. Range Management 1951 : 4 : 16-18.

The need for recommended species and strains for reseeding the western ranges of USA is emphasized. Promising performances from a few strains of bluestem (*Andropogon*) and lovegrass (*Eragrostis*) introduced by chance are cited as indications that an organized and adequate sampling of the available genetic material in the world's grass resources would justify the effort.

2720. ZALKIND, F. L.
(Sudan grass, a valuable forage plant).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 10 : 25-30. [Russian].

Several varieties of Sudan grass recently developed in the USSR are described. Odesskaja 25 [Odessa 25] was bred at the USSR Institute of Breeding and Genetics. It is a mid-season variety resistant to drought and adapted to varied ecological conditions with a growth period of 95 to 115 days. Under Ukrainian conditions the variety yields 60 to 120 c. hay per ha. Odesskaja 25 has been made a standard in 13 provinces of the USSR.

Krasnodarskaja 1967 [Krasnodar 1967], a tall mid-season variety, showing resistance to drought and good yield response to rainfall, was developed at the Krasnodar State Breeding Station. It yields 60 to 150 c. hay per ha. It has been made a standard for the Krasnodar and Stavropolj territories and for the Rostov province.

Černomorka [Black Sea], a promising tall, productive mid-season variety, is still under trial. It was bred at the USSR Institute of Breeding and Genetics.

Kineljskaja 90, developed at the Kineljskaja State Breeding Station, is an early variety showing promise for the arid south eastern districts.

Brodskaja 2 [Brody 2], bred at the Brody Experimental Field Station of the Čkalov Scientific Research Institute, is an early variety reaching seed maturity in 114 days under Baškirian conditions. It can be cut for hay five to seven days before Odesskaja 25. The variety is still under trial.

2721. ZYBIN, P.

***Echinochloa frumentacea*, a new forage crop).**

Kolhoznoe Proizvodstvo (Collective Farming) 1951 : No. 3 : p. 59.
[Russian].

In trials conducted in the Sumy province, *E. frumentacea* gave three cuts of hay with a total yield of 111 c. per ha. Mention is made of varieties Ostistaja 35 [Awned 35] and Bezostaja 10 [Awnless 10].

2722. WARMKE, H. E.

Cytotaxonomic investigations of some varieties of *Panicum maximum* and of *P. purpurascens* in Puerto Rico.

Agron. J. 1951 : 43 : 143-491.

Five strains of *P. maximum* are described which have been given the varietal names of Gramalote, common, Broad Leaf, Borinquen and Fine Leaf respectively. The strains differ in morphological characters, age at which flowering occurs and in hour of anthesis. With the exception of Borinquen, the strains have a chromosome number of $2n = 32$. Two types of Borinquen were found: one with $2n = 32$ and another with $2n = 48$. Investigations of meiosis revealed that the types with $2n = 32$ are autotetraploids and that the type of Borinquen with $2n = 48$ is an autohexaploid. The related species *P. purpurascens* ($2n = 36$) is an allotetraploid. Self fertility in the five strains of *P. maximum* ranged from 4.5 to 48.7% in terms of viable seed production; *P. purpurascens* produced 36.3% viable seeds. Intravarietal uniformity and the absence of hybrids among open-pollinated progenies of *P. maximum* are discussed with reference to possible apomixis in this species.

2723. BJÖRKMAN, S. O.

Chromosome studies in *Agrostis*.

Hereditas, Lund 1951 : 37 : 465-68. (Abst.).

Chromosome numbers of ten species within the section *Trichodium* are reported. Supernumerary chromosomes are described in *A. canina* var. *fascicularis* ($2n = 14$). A high frequency of quadrivalents was observed in the tetraploid variety *arida* ($2n = 28$). Although morphological transitions between the two varieties occur rarely in nature, a hybrid with a chromosome number of $2n = 21$ was obtained.

2724. MYERS, W. M.

Registration of varieties and strains of wheatgrass (*Agropyron* spp).

Agron. J. 1951 : 43 : p. 239.

The recently registered variety Primar (*A. trachycaulum*) is described (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 988).

2725. BEAUDRY, J. R.

Seed development following the mating *Elymus virginicus* L. x *Agropyron repens* (L.) Beauv.

Genetics 1951 : 36 : 109-26.

When *E. virginicus* is pollinated by *A. repens* seed development is initiated but viable seeds are not produced. Embryological investigations have revealed that the physiology of the antipodals is disturbed by a stimulus imparted by the male gamete in association with the polar nuclei, as shown by the unusual activity of the antipodals. Since the secretory function of the antipodals is altered, the nutrient supply of the endosperm is

disturbed; mitosis in the endosperm becomes highly irregular and the tissue breaks down and finally disappears.

2726. SNYDER, L. A.
Cytology of inter-strain hybrids and the probable origin of variability in *Elymus glaucus*.
 Amer. J. Bot. 1951 : 38 : 195-202.

In an earlier paper (cf. Abst. 1903) it was shown that morphological and physiological differences between *E. glaucus* strains are maintained by genetic isolating mechanisms, most of the F_1 interstrain hybrids showing sporophytic abnormalities or a very low level of pollen fertility. The nature of this pollen sterility has been investigated in 22 F_1 interstrain hybrids. No marked lack of chromosome homology was noted; several of the hybrids did however exhibit low frequencies of univalents. Meiotic irregularities included translocation amphibivalents, inversion bridge fragments, lagging chromosomes, fragmentation and bivalent heteromorphism. In 18 of the hybrids, 15 to 90% of the pollen abortion could not be explained on the basis of the visible meiotic abnormalities. This residual sterility is probably the result of cryptic structural differences and specific genes. The possible origin of the morphological variability and genetic isolating mechanisms within the self-pollinating allopolyploid species *E. glaucus* is discussed. Two alternative suggestions are offered: (1) intergeneric hybridization of *E. glaucus* followed by introgression and inbreeding; or (2) hybridization between a self-pollinating and a cross-pollinating species, the heterozygous genome of the latter species being affected by subsequent inbreeding.

2727. UCHIKAWA, I.
(Cytological studies of Japanese bamboos).
 Jap. J. Genet. 1943 : 19 : 112-13. [Japanese].

Chromosome numbers are listed of Japanese representatives of the following genera: *Bambusa*, *Phyllostachys*, *Pleoblastas*, *Pseudosasa* and *Sasa*.

2728. COVAS, G.
 Nueva especie de *Hordeum* de la flora Argentina. **(A new species of *Hordeum* of the Argentine flora).**
 Rev. Argent. Agron. 1950 : 17 : 230-32.

A description is given of the weed species *H. hexaploidum* with $2n = 42$ and of the features which distinguish it from other species. It is a plant of strong growth, resistant to drought, and is eaten by stock. It should therefore be a useful fodder plant.

2729. KORNILOV, A. A.
(*Agropyron* variety Dolinskiĭ 1).
 Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 10 : 30-32. [Russian].

Agropyron sibiricum varieties Dolinskiĭ 1 and 3, bred at the Karaganda Agricultural Research Station, did well in trials with Omskiĭ 1342 [Omsk 1342], Krasnokutskiĭ 305 [Krasnyi Kut 305], and Krasnokutskiĭ 4.

Dolinskiĭ 1 was the more productive of the two and showed a higher degree of resistance to drought than Dolinskiĭ 3. Both varieties were obtained from a local Kazah population by single plant selection for vigorous growth, productiveness and uniform late maturity. The selected material was then freely cross-pollinated within each group of families.

Reference is made to the lucerne varieties Bogarnaja 2 [Rain Fed 2] and Gibrinaja 3 [Hybrid 3], bred at the Karaganda Agricultural Research Station. Under Kazah conditions the new lucernes are more productive and show a higher resistance to drought than Poltavskaja [Poltava].

LEGUMINOUS FORAGE PLANTS

2730. BIGNOLI, D. P.
Características de algunos biotipos de alfalfa. (**Characteristics of certain lucerne biotypes**).
Rev. Argent. Agron. 1951 : 18 : 1-12.

Differences in habit, morphology and tillering were noted in young plants of nine lucerne varieties of different origin and it is concluded that these characters could be utilized in selecting forms adapted to different climatic conditions.

2731. NILAN, R. A.
Rhizoma alfalfa: chromosome studies of the parent stocks.
Sci. Agric. 1951 : 31 : 123-26.

At the University of British Columbia a cytological study has been made of the lucerne variety Rhizoma (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1841) and its parents. It was derived, by selection through six generations, from an interspecific cross between the variety Don of *Medicago falcata* and the variety Grimm of *M. sativa*. Four of the six original hybrids and most plants of the F_2 and succeeding generations, including Rhizoma, are tetraploids ($2n = 32$). Since triploid progeny would be expected from a cross between the diploid *M. falcata* ($n = 8$) and the tetraploid *M. sativa* ($n = 16$), it is suggested that normal male gametes from the tetraploid parent fertilized some abnormal unreduced female gametes.

2732. STANFORD, E. H.
Tetrasomic inheritance in alfalfa.
Agron. J. 1951 : 43 : 222-25.

The factor for purple flower colour in lucerne has been found to be inherited in a tetrasomic manner. Evidence of genetic double reduction was obtained; cytological examination revealed the occurrence of occasional quadrivalents, thus confirming the genetic observations. The case of tetrasomic inheritance raises the question as to whether this type of inheritance is the exception or the rule in lucerne. It is pointed out that F_2 data are inadequate for determining whether the inheritance of a character is disomic or tetrasomic; thus examination of the literature does not provide much additional information. The significance of tetrasomic inheritance in breeding is discussed.

2733. McALLISTER, D. R.
The combining ability of selected alfalfa clones as related to the self-fertility of the clones, their F_1 and F_2 progenies.
Iowa St. Coll. J. Sci. 1951 : 25 : 283-84.

Self fertility among 14 parental clones of lucerne varied from 0.14 to 2.64 seeds per flower artificially tripped in 1949; similar ratings for self fertility were recorded in 1948. Variability in self fertility within a single clone was often high, suggesting the need for replication in studies on self fertility, although the analysis of variance did not indicate a significant difference among members within clones. Highly self fertile clones produced approximately three times as many seeds when selfed or crossed as the clones in the group with low self fertility, indicating a relationship between self and cross fertility. The group with high combining ability and that with low combining ability, however, showed little difference in seed production. F_1 progenies from clones with high combining ability yielded, on the average, significantly more than those from clones with low combining ability; differences in forage yield between the two fertility groups were not significant. Self fertility within S_1 clones and within F_2 progenies obtained by selfing F_1 plants varied significantly, whereas self fertility within F_1 progenies did not differ significantly. The rank of the parental clones for self fertility was maintained in the F_2 , although the average self fertility was considerably reduced. The self fertility of the parental clones was not significantly correlated with the yield of parental clones, F_1 or S_1 progenies. The yield of parental clones was significantly correlated with the yield of F_1 and S_1 progenies.

2734. GREENSHIELDS, J. E. R.
Polyembryony in alfalfa.
Sci. Agric. 1951 : 31 : 212-22.

A cytological study of twin seedlings in the varieties Ladak and Grimm, with particular reference to chromosome number, has been carried out at the Dominion Forage Crops Laboratory, Saskatoon, in an attempt to obtain diploid ($2n = 16$) plants, from which relatively homozygous strains might be developed. All the pairs examined had a normal tetraploid chromosome complement ($2n = 32$), although limited areas of diploid and octoploid cells were found in several root tips. Four chromosomes with satellites are described, giving additional evidence of the auto-tetraploid nature of *Medicago sativa*.

2735. BOTTAZZI, G. B.
Profilo tipologico dell'erba medica (*Medicago sativa* L.). [An outline of the types of lucerne (*M. sativa* L.)].
Genetica Agraria, Roma 1950 : 2 : 199-232.

This study is concerned with the phenotypic variation in the indigenous populations of *M. sativa* in Italy and with individual differences in plant response to environmental conditions. Variation was studied in regard to yield, longevity, frost resistance, earliness and adaptability to the conditions of plant association found under cultivation. Flowering, fruiting and the morphological features of the plant were also examined and the physiological and morphological characteristics of the ideal type are defined as a basis for work on the improvement of lucerne.

2736. MULJARČUK, S. A.
(A glandular lucerne, *Medicago glutinosa* M.B.).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1949 : 66 : 701-04.
[Russian].

This wild species from Dagestan was studied at Sumy. It was productive, hardy and had a well developed root system. The species can be propagated vegetatively.

2737. JONES, F. R.
Seed setting performance in certain alfalfa populations.
Agron. J. 1951 : 43 : 151-52.

In a study of 70 F_1 populations of lucerne involving crosses between 60 plants, uniformly high seed production in a population was associated with early flowering and a relatively low position of the first inflorescences on the stem. Populations showing high seed production were invariably the result of a cross between plants with a record of high seed yield. Crosses between plants with high and low seed yields gave populations with few or no plants possessing high seed yielding capacity. It is suggested that day length and temperature at the time of stem formation exert, at least at some extremes, a controlling influence upon the position of the flowers, and possibly upon suitability of flowers for seed production. It is further suggested that differences in ability to recover from or resist damage due to sucking insects may be another factor affecting seed production.

2738. WILLIAMS, W.
Experiments on the yield of lucerne strains as pure plots and on the behaviour of lucerne when sown in mixture with various species of grasses.
J. Brit. Grassland Soc. 1950 : 5 : 113-29.

Under conditions at Aberystwyth, Wales, the varieties Hardigan, S 205, Cossack and Grimm, which originated in northern latitudes, have proved superior in yield, hardiness and persistency compared with Provence Hunter River and Booborowie from Mediterranean climates. Data from nine centres where lucerne was grown in combination with grasses

have shown that the percentage survival of lucerne decreases in any mixture but particularly with aggressive species such as *Dactylis glomerata*.

2739.

1950 Report of the Uniform Alfalfa Nurseries conducted cooperatively with the various State and Federal Agricultural Experiment Stations in the United States and Canada represented in the Alfalfa Improvement Conference.

U.S. Dep. Agric.; Agric. Res. Admin.; Bur. Pl. Indust. Soils Agric. Engin.; Beltsville, Md 1950 : Pp. 184. (Mimeographed).

The results are summarized of nursery tests carried out at the State and Federal Agricultural Experiment Stations of the United States and in Canada to study strains of various origins, including the so-called A and C strains (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1852). Information is given on stand, yield, winter killing, incidence of diseases, seed production and other characters.

2740. SPIES, P.

Klee- und Grassamenzüchtung und Vermehrung. (Breeding and multiplication of clover seed and grass seed).

Arb. dtsch. LandwGes. 1950 : 6 : 91-102.

In the case of clover and grasses family breeding is not desirable since with increasing uniformity of leaf form resistance to weather and certain pests decreases. For maintenance breeding of clover and grass the use of strains of related species and occasional crossing with the original material, i.e. the best land varieties, are recommended. Moreover, in clovers and grasses a certain multiplicity of forms is desirable; in this connexion it is pointed out that the hybrid varieties amongst the lucernes are still in a high class as regards persistence, yield and immunity.

2741. HOLLOWELL, E. A.

Registration of varieties and strains of red clover, II.

Agron. J. 1951 : 43 : p. 242.

The red clover Kenland, developed at the Kentucky Agricultural Experiment Station, has been approved for registration. The variety has good growth characteristics, and is highly resistant to southern anthracnose (*Colletotrichum Trifolii*) and moderately resistant to crown rot (*Sclerotinia Trifoliorum*). It has resulted from several generations of selection of material originating from eight adapted strains.

2742. HELLBO, E.

Typ och stam hos rödklöver. (Type and strain in red clover).

Årsb. Svensk. Jordbr. Forsk. 1951 : 142-45.

A long series of trials of red clover strains has been conducted throughout Sweden and the seed growers and farmers should recognize their value as indications of (1) yield, hardiness and resistance to diseases and pests; and (2) the best strains for different regions of cultivation. On the other hand, the type, i.e. whether early, medium early, or late, should not be regarded as indicative of performance in other respects, and it must be remembered that earliness is not a guarantee of hardiness. Moreover, some Norrland strains that are medium early in flowering time possess the hardiness and the growth habit of strains of the late type.

The value of bred strains and local strains is discussed with a warning against accepting untested local strains which may have been merely named after farms on which they have been grown with success for a number of years.

Seed officially guaranteed by name, and not only for type, should be preferred. The

register of the Swedish Seed Growers' Union provides information on strains adapted for different regions.

2743. KIVIMÄE, A.
Den di- och tetraploida rödklövers kemiska sammansättning. (**The chemical composition of diploid and tetraploid red clover**)
Sverig. Utsädesfören. Tidskr. 1951 : 61 : 13-24.

Analysis of the diploid red clover Ultuna and the tetraploids, Ultuna, Offer and Merkur x Wambåsa showed that chromosome doubling had led to an improvement in nutritional value. Dry matter content was lowest in the tetraploids, which however showed the highest content of protein, ether extract and phosphorous, and the lowest content of crude fibre, ash and calcium. The tetraploids differed slightly in chemical composition and they also developed more slowly at first than the diploids. Differences between the tetraploids and diploids were greatest in the wet year 1948 and least in the dry year 1947.

2744. IVANOVSKIĬ, A. I.
(**Pečorskiĭ red clover**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 10 : 20-24. [Russian].

A wild Pečorskiĭ [Pečora] clover, remarkable for its hardiness, earliness, longevity, resistance to water logging, and adaptability to varied climatic conditions, is described. The clover is regarded as promising material for breeding cultivated varieties yielding between 40 and 50 centners hay per ha. under Siberian conditions, and clovers suitable to uninterrupted cultivation for five to seven years upon marshes used for grazing animals.

2745. FULLER, L.
Mother White feeds the turkeys, the grower reaps the profit.
Sth. Seedsman 1951 : 14 : No. 4 : 36, 62.

The performance of Mother White, the new white clover variety developed in Louisiana by W. T. Nolin, is described; it has provided suitable pasture for turkeys. The plants are vigorous and will stand continuous heavy grazing, producing a large seed crop.

2746. WILLIAMS, W.
Genetics of incompatibility in alsike clover, *Trifolium hybridum*.
Heredity 1951 : 5 : 51-73.

T. hybridum has been found to be highly self sterile; its cross compatibility is of the oppositional type first described in *Nicotiana*. The data indicate that variation in pseudocompatibility is directly controlled by the *S* genes and not by modifiers. In certain heterozygotes investigated, the interaction of two different *S* factors in the style exerted a considerable effect upon the level of pseudocompatibility of the allele carried by the male parent. Such an interaction between the two *S* alleles in the style, resulting in the weakening of the expression of the allele with a strongly inhibitory action, may be the effect of competition for a basic precursory compound necessary for the synthesis of the final inhibitory substances.

A plant of the genotype *Sc. c* was isolated in which the change in *Sc* did not enable it to become fully compatible with the normal *Sc* allele. The alteration is considered to be either the result of mutation of the locus *Sc* or of a crossover within the locus *S*.

The number of *S* alleles in *T. hybridum* is extensive: out of 21 alleles studied, 13 were found to be different.

The evolution of incompatibility is discussed. A fairly general association exists between annual habit and self fertility; it is therefore suggested that self sterile perennial forms arose from more primitive self fertile annual forms, and that the oppositional type of sterility originated through mutation in self fertile plants.

2747.

Subterranean clover. Opportunity knocking at door.

Commonw. Agric. 1951 : 21 : 13-16.

At Burnley Research Station, Victoria, over 20 strains from different states have been graded into groups representing early, mid-season and late maturity. The relative performances of Dwalganup, Bacchus Marsh, Mt. Barker and Tallarook are discussed in respect of rainfall requirements.

2748. LIGON, L. L.

Cowpeas for Oklahoma.

Bull. Okla. Agric. Exp. Sta. 1951 : No. B-371 : Pp. 15.

Varieties recommended for Oklahoma are described, with tables of average yields. No variety is immune from bacterial canker, bacterial blight or mosaic, but differences in degree of susceptibility are sufficient to indicate the possibility of breeding strains with improved resistance.

2749. BATES, G.

Trials with new legumes.

Cane Gr. Quart. Bull. 1951 : 14 : p. 154.

The results of adaptability trials of cowpeas, suitable for green manure, in the cane growing areas of North Queensland are reported. New varieties from Costa Rica proved less wilt resistant than Q 1582 or Cristaudo which are already widely grown.

2750. STERN, W. R.

Varietal trials—1950 season.

Cane Gr. Quart. Bull. 1951 : 14 : 127-40.

At Bundaberg the yields of four commercially grown velvet bean varieties were compared with four recent introductions.

The results of sugar cane yield trials carried out in all the sugar growing localities of Queensland are summarized and discussed.

2751. BLACK, L. M.

Hereditary variation in the reaction of sweet clover to the wound-tumor virus.

Amer. J. Bot. 1951 : 38 : 256-67.

Numerous clones from commercial and inbred lines of *Melilotus alba* and *M. officinalis* have shown a wide range of reaction to the wound tumour virus during experiments at Brooklyn Botanic Garden, NY.

It is suggested that the many variations are determined by a genetic complex and that some of the genes in this complex may also affect general vigour, as the most resistant clone, C6, was also the least vigorous.

2752.

Alta Blue Lupine.

Seed World 1951 : 68 : No. 10 : p. 35.

The new bitter blue lupin strain Alta, selected at the Florida Agricultural Experiment Station for use as a soil-improving winter cover crop, has the advantage of anthracnose resistance, vigorous early growth, and increased production of green material and seed.

2753. BYSZEWSKI, W.

Studia nad lubinem pastewnym. (Studies on the fodder lupin).

Ann. Univ. Mariae Curie-Skłodowska, Lublin 1950 : 5 : Sect. E : 143-201.

A table is given showing the existence or absence of correlations in *Lupinus luteus* between

19 morphological and physiological characteristics, many of which are concerned with yield and therefore of interest to breeders. A slight correlation exists between the height of a plant and its susceptibility to mildew. A tall variety of blue lupin, L3, is mentioned as being less susceptible to diseases.

The influence of selection on the yield of individual plants over a period of six years is shown in tabular form.

The use of micromethods, especially colorimetric methods, of quantitatively estimating alkaloids is recommended in breeding work, where the amounts of available material may be small.

2754.

Sortsforsøg med lupiner 1946-49. (**Variety trials with lupins 1946-49**).

Tidsskr. Planteavl 1951 : 54 : 357-60.

The results are shown in tabular form for variety trials of yellow lupins grown for harvesting (a) ripe, and (b) green. In section (a) the averages for 16 experiments showed that the four best varieties as regards yield of seed were Pajbjerg Nos. 515, 471 and 481 and Södlupin, D.L.F. [Sweet lupin, D.L.F.]. These varieties were also superior in yield of crude protein, but in this respect Pajbjerg 302 was also as good as Södlupin D.L.F.

In section (b) the four varieties Reformlupin [Reform lupin] and Pajbjerg Nos. 515, 471 and 481 gave the best yields of seed and crude protein.

Little difference was observed in regard to earliness of flowering.

2755.

VAN EMDEN, J. H.

Doornloze *Mimosa*. (**Thornless Mimosa**).

Bergcultures 1951 : 20 : p. 201.

From seed of *M. invisa* obtained from an estate in Java, F₂ seedlings have been raised that are completely without thorns. Though the plant is not so sturdy as the type with thorns, its value as a crop plant is not doubted.

2756.

SAVENKOVA, E. P.

(**Varieties of serradella**).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 : p. 75. [Russian].

Two new varieties of serradella, 3587 and 2942, have been bred at the Novozybkovskaja Research Station, both yielding more hay and seed than P-5, a productive mid-season variety, resistant to drought, which was developed previously at the institute.

Variety 3587 was derived from P-5. It reaches maturity in mid-season and yields 13% more hay and 19% seed than P-5.

Variety 2942 was selected from a population. It is a mid-season variety yielding 25% more hay and 19% more seed than P-5. The varieties have not passed the trial stage. Breeding work with serradella is being continued. The aims are indehiscent varieties and forms with a winter habit.

2757.

SCHOFIELD, J. L.

Serradella (*Ornithopus sativus*), a legume for light acid soils.

J. Brit. Grassland Soc. 1950 : 5 : 131-40.

An account of the cultivation of serradella (*Ornithopus sativus*) includes a discussion of the possibilities of improvement within the genus, by hybridization and selection, to produce a group of strains resistant to *Colletotrichum Trifolii* and suited to various edaphic and climatic conditions.

2758. DAVIS, R. L. and
YOUNG, W. C.

Kudzu-23—a new fine-textured variety.

Soil Conserv., U.S. Dep. Agric. 1951 : 16 : 279–80.

Kudzu-23, a variety produced by propagating a single drought resistant plant found near Watkinsville, Ga., is being distributed by the US Soil Conservation Service. Its foliage and stems are unusually fine textured and thus this kudzu provides an improvement in forage quality. It also possesses several characteristics which render it valuable for soil conservation.

ROOTS AND TUBERS

2759. PALAMARČUK, A. S.

(The evaluation of the parent plants in the first hybrid generation of root crops).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 10 : 16–19. [Russian].

The results of breeding work involving crosses between different varieties of *Beta*, crosses between radishes, and a cross between *Brassica campestris* and a variety of rape at the Timirjazev Agricultural Academy are reported. The experiments showed that high yielding hybrids can be selected in the F_1 . Analyses of the hybrids from some direct and reciprocal crosses suggest that the female varieties exert great influence on the yielding capacity and other economic characters of the hybrids. Mention is made of the following direct crosses which have given better results than their reciprocals. The sugar beet Saharnaja [Sugar] x Bordeaux gave roots weighing 817 grm. The radish variety Ledjanaja Sosuljka [Icicle] x Černaja Zimnjaja Kruglaja [Round Black Winter] yielded roots which weighed 203 grm. and had a better flavour than the initial varieties. The radish variety Rozovyj s Belym Koncikom [White Tipped Pink] x Ledjanaja Sosuljka gave good sized roots of good flavour.

It is recommended that the F_1 material from intervarietal crosses of root crops should be used extensively on farms as well as at breeding institutes.

2760. ERDMANN, K.

Verfahren zur Erzielung von vollwertigen Samenträgern der *Beta*-Rübe im ersten Vegetationsjahr mit Hilfe von Kälte-Behandlung.

(A method of inducing seed bearing in *Beta* varieties in the first year of growth by means of cold treatment).

Züchter 1950 : 20 : 291–302.

Bolting in the first year may be induced in beets by subjecting them for 3–8 days to a temperature around 0° C. The reactions of German fodder and sugar beets to this treatment are tabulated.

2761. RADEMACHER, B.

Was wissen wir von der Blattfleckenkrankheit der Rübe (*Cercospora beticola* Sacc.)? [What do we know about leaf spot of beet (*Cercospora beticola* Sacc.)?]

Neue Mitt. Landw. 1951 : 6 : 418–19.

In general, forage beets, having fewer leaves, suffer more seriously from *C. beticola* than sugar beets, but varietal differences in the resistance of certified beet varieties in Germany are very slight and are generally masked by the variation in susceptibility due to different provenance of the beets. The German firm Rabbethge-Giesecke has bred a variety CR which has proved practically resistant for years in Hohenheim. Unfortunately its yield is still too low. The same firm's polyploid beet is very resistant though not equal to CR. A new Viennese strain Y P, tested in 1950 at the Hohenheim Institute for Seed Production, is also stated to be very resistant.

2762. JOSEFSSON, A.
Resultat från 10 års prövning av Svalövs fodersockerbeta Solid.
(Results of 10 years' testing of the Svalöf sugar mangel Solid).
Sverig. Utsädesfören. Tidskr. 1950 : 60 : 434-39.

The variety Solid, put on the Swedish market in 1949, was obtained by repeated selection in crosses involving fodder beets, sugar beets and sugar mangels. Tables are given showing its performance in trials at Svalöf with the varieties Nova, Milka, Särimner III, Regia, Svea-Rex, Monark and Gullåker from 1940 to 1949. In addition to yield of root, total dry matter and tops, the incidence of bolting, and the dry matter content were also noted. The short plump root with a broad neck is white below ground and green above the soil. Pale pink spots are seen on some plants. The root projects high above the soil and is therefore easy to lift and to clean.

2763. BLEIER, H.
F. von Lochow's Stoppelrübe "Rotkäppchen". (F. von Lochow's late
turnip Rotkäppchen).
Unsere Saatzucht Hasselhorst : 25-27.

The processes of selection and breeding, including the elimination of plants with a high mustard oil content and subsequent testing of the seed yield, are described, using the variety Rotkäppchen [Red Cap], which is mainly used as fodder, as an example.

2764. YAKUWA, K.
(On the allopolyploids obtained from *4x-Brassica chinensis* L. x
4x-Brassica napus L.)
Jap. J. Genet. 1943 : 19 : 229-34. [Japanese].

Plants with 50, 58 and 60 chromosomes, respectively, were obtained from the above cross. In all cases, multivalents were observed at meiosis; fertility was poor. All three hybrids resembled *B. Napus*.

2765. YAKUWA, K.
Cytological studies on autotetraploid *Brassica chinensis* L.
Cytologia, Tokyo 1944 : 13 : 162-69.

Cytological observations were carried out on the progeny of colchicine induced autotetraploids of *B. chinensis*. Irregularities at meiosis included the production of 1-6 quadri-valents, with occasional trivalents and univalents giving rise to lagging. Daughter nuclei received a balanced number of chromosomes in 64.37% of the observed divisions.

2766. ISHIIHASHI, H.
(Investigations on hybridization in seed-raising gardens for
Cruciferous vegetables).
Agric. and Hort., Japan 1949 : 24 : 123-24. [Japanese].

Figures are given of the degree of crossing that occurred between two Japanese types of cabbage and one turnip variety being grown for seed in proximity to each other.

2767. Scottish Plant-Breeding Station, Craigs House, Corstorphine,
Edinburgh.
Trans. Highl. Agric. Soc. Scot. 1950 : 62 : 70-71.

A review is given of work on swede breeding for club root resistance and other characters and on the problem of finding suitable varieties of sugar beet for Scotland (cf. Abst. 865).

2768. NISSEN, Ø.
 Forsøk med stammer av kålrot 1946-1949. (**Strain trials with swedes 1946-49**).
 Forskning Forsøk Landbruk., Oslo 1950 : 1 : 581-92.
- NISSEN, Ø.
 Kålrotstammeforsøk i 1946-1949. (**Strain trials of swedes in 1946-49**).
 Samvirke, Medd. Felleskjøpet, Oslo 1950 : 45 : 117-19.

In these trials Norwegian, Danish (cf. Abst. 1936) and Swedish strains, tested at various experimental stations in Norway, were compared with reference to the following points among others: content and total yield of dry matter; leaf production; fodder value of roots and tops; and the incidence of club root, cracked roots, numerous leaf scars, bolting, and disease resulting from damage by cabbage fly.

On the average, the Danish strain Bangholm, Otøfte X outyielded all other strains, though at Jaeren and Trøndelag it was equalled by the best Danish strains of the Wilhelmsburger type. Three Norwegian Bangholm strains which proved approximately as good as the Danish were: Bangholm Olsgaard from Rogaland, Bangholm Gokstad from Vestfold and Bangholm Hunsballe, Vidarshof I.

2769. HODGE, W. H.
Three native tuber foods of the high Andes.
 Econ. Bot. 1951 : 5 : 185-201.

An account is given of the characteristics, cultivation and uses of oca (*Oxalis tuberosa*), ullucu (*Ullucus tuberosus*) and añu (*Tropaeolum tuberosum*) in the Andean highlands. The greatest number of varieties occur in the region of Lake Titicaca, which thus appears to be the centre of origin of these tuber plants.

2770. HOYMAN, W. G. and
 MATTSO, H.
The Kennebec potato in North Dakota.
 Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1951 : 13 : 139-41.

Among new varieties recently tested in North Dakota, Kennebec, released by the US Department of Agriculture in 1948 (cf. *Plant Breeding Abstracts*, Vol. XIX. Abst. 1079), shows most promise; its performance is described.

2771. KAWAKAMI, K.
(Conspectus of investigations on the potato in various foreign countries).
 Agric. and Hort., Japan 1949 : 24 : 111-14. [Japanese].

Breeding work on the potato in England and Scotland is described.

2772. HAWKES, J. G.
 Informe sobre la comisión a Inglaterra. (**Report on the mission to England**).
 Minist. Agric. Ganad., Colombia 1950 : Pp. 45. (Mimeographed).

An account is given in Spanish of the work in potato breeding and cognate subjects at various institutions in Great Britain, based on a visit of inspection made by the author on behalf of the Colombian ministry of agriculture. The stations visited included the Commonwealth Potato Station, National Institute of Agricultural Botany, Plant Virus Station, Plant Breeding Institute and Botany School at Cambridge, the Rothamsted Experimental Station, the Long Ashton Horticultural Research Station and the Scottish Society for Research in Plant Breeding, Edinburgh.

2773. PAL, B. P. and
PUSHKARNATH.

Potato-breeding investigations in India.

Emp. J. Exp. Agric. 1951 : 19 : 87-103.

A survey is presented of potato breeding carried out at the Indian Agricultural Research Institute, Delhi, and its branch stations at Simla, Pusa and elsewhere during the period 1935 to 1949. Information is given on the various collections studied. In the earlier stages of the programme, work was concentrated upon improvement by crossing desi types with commercial varieties from Europe and America. Hybrids adapted to the long and short day conditions of the hills and plains, respectively, have been selected. The semiwild characters of the desi varieties, however, proved to be dominant, and thus the scope of selection was restricted. The severe incidence of virus diseases in the plains, which often resulted in total loss of hybrid progenies selected at Simla, created another difficulty. Use was therefore made of a much wider range of material. Progress has been achieved in developing promising hybrids resistant to late blight, using *Solanum demissum*. Introduced material is now available for breeding activities on resistance and field immunity to virus diseases.

A succinct account is given of the results of genetical investigations on interspecific crossability and the various causes of sterility, and of studies on pollen size and shape, pollination, time of opening and closing of flowers, crossing technique, and the possibilities of using tuber tops, eyes and sprouts for commercial propagation.

In view of the considerable expansion of breeding work in recent years, the Central Potato Research Institute was established at Patna by the Indian Government in 1949. The collections and hybrid material have been transferred to the new Institute as the basis of the programme of improvement now in progress.

2774. KRANTZ, F. A.

Potato breeding in the United States.

Z. Pflanzenz. 1951 : 29 : 388-93.

A general review of potato breeding methods used in the USA since 1850 refers to the present problems of combining many desirable characters in varieties adapted to a specific location and suitable for a definite purpose. Investigations have begun at the Minnesota Experiment Station in connexion with the possibility of grafting the periderm of types resistant to common scab, late blight and several virus diseases on to susceptible commercial varieties (cf. Abst. 2775).

- 2775.

The National Potato-Breeding Program 1950.

21st Ann. Rep. to Cooperators, Beltsville, Md., 1951 : Pp. 227.
(Mimeographed).

National Potato-Breeding Program, 1950

Stevenson, F. J. (pp. 1-3).

Improvement work is surveyed with reference to specific gravity; resistance to late blight, scab, *Verticillium* wilt, ring rot and virus diseases; and the new varieties Pungo (cf. Abst. 1153) and Cherokee. Cherokee, released jointly by the US Department of Agriculture and the Iowa and Indiana Agriculture Experiment Stations, is resistant to late blight and scab. It is well adapted to muck soils in the north central states and has mid-season maturity, good cooking quality and higher yielding capacity and specific gravity than Cobbler. One of the best varieties among those not yet released is B 606-67, which is immune from virus A and X and nearly immune from the common races of late blight. It produces high yields with relatively high specific gravity; its tuber shape is not entirely satisfactory but compares favourably with that of Green Mountain.

U.S. Department of Agriculture

Stevenson, F. J., *Plant Industry Station (Beltsville, Md.) and*
Akeley, R. V. and *Chapman and Aroostook Farms (Presque Isle,*
Schultz, E. S. *Maine). (pp. 4-13).*

The following activities continued: production of seed of new crosses and selfed lines; distribution of seed, seedlings and varieties to state agricultural experiment stations and to foreign countries; and testing of seedlings for disease resistance. Varieties immune from virus A have been released. Four varieties with immunity from virus X have been developed, one of which, B 926-9, is also resistant to scab and virus A; these are to be further tested before their possible release.

Akeley, R. V., *Date of planting. (pp. 14-16).*
Merriam, D.,
Stevenson, F. J. and
Bonde, R.

Data are given on the performance of eight varieties planted in 1950 at four different dates at Aroostook Farm, Presque Isle, Maine. The results of tests of family lines for resistance to scab and late blight are also summarized. About 44.8% and 48.5% of the seedlings remained free from late blight in the foliage and tuber tests, respectively; in the scab tests 52.9% of the seedlings were more resistant than the control Green Mountain.

Akeley, R. V. *Quality of french fries as influenced by variety,*
date of planting, and date of harvesting.
(pp. 17-19).

Kennebec showed the best quality for crisp making among the eight varieties studied and Green Mountain the poorest.

Lombard, P. M. and *Effect of sprays on yield of certain potato varieties.*
Akeley, R. V. *(pp. 20-21).*

The effect of different fungicidal sprays upon the yields of Kennebec, Green Mountain, Sebago and Katahdin was determined at Aroostook Farm.

Schultz, E. S. *Virus A. (pp. 22-23).*

Results have been obtained showing that (1) a high percentage of the progeny from virus A immune parents are immune from this virus; (2) that immunity from A can be combined with immunity from virus X; and (3) immunity from A and X can be combined with resistance to common scab and certain races of late blight.

Schultz, E. S. *Virus Y. (pp. 24-25).*

The reactions of seedlings from crosses involving Chippewa and selfed seedlings of this variety to virus Y were studied under field conditions at Aroostook Farm. A few seedlings that have not become infected in the 1950 and previous tests are apparently more highly resistant than field resistant varieties such as Chippewa and Katahdin.

Dykstra, T. P., *Southeastern project (Louisiana headquarters).*
Miller, J. C., *(pp. 26-30).*
Webb, R. E. and
Noonan, J.

Progress has been made in the development of a red variety resistant to scab and late blight and of a blight resistant white variety. The results of hybridization under southern conditions are described.

Edmundson, W. C. *U.S.—Colo. Potato Field Station (Greeley, Colorado).*
(pp. 31-33).

Breeding for scab resistance and improved cooking quality in red and white varieties is being carried out. Among the older seedlings, 5244 and 6362 show particular promise. Seedling 5244 is resistant to scab, hollow heart and formation of growth cracks, but has

the disadvantages of large haulms and late maturity. Seedling 6362 is not scab resistant but develops much less scab than most commercial varieties; its tuber characteristics are very satisfactory.

Schaal, L. A. Colorado (Fort Collins). (pp. 34-37).

Material supplied by the US-Colorado Potato Field Station and other stations was tested. The number of scab races appears to be higher than was suspected. The variability of scab resistance from one region to another emphasizes the necessity of testing all new selections in the area in which later they may be grown commercially.

McLean, J. G. Pacific Northwest. (pp. 38-44).

Work is being carried out on the development of varieties resistant to *Verticillium* wilt and scab, and adapted to irrigated conditions. Several lines have been found combining resistance to both diseases. Time of maturity and amount of *Verticillium* infection are apparently correlated; so far no highly resistant lines have been found in early potatoes.

California

Davis, G. H. (pp. 45-51).

The results of tests on varieties and seedlings for yield and scab resistance at Shafter and for yield and reaction to *Verticillium* wilt at Hollister are reported. Only Menominee, Ontario and B56-1 showed a level of resistance to scab which was of economic significance. Several varieties and seedlings exhibited considerable tolerance of wilt.

Connecticut

Hawkins, A. (pp. 52-53).

The results of yield trials of Kennebec, Teton and other commercial varieties at two centres are summarized.

Delaware

*Brasher, E. P. Irish potato variety and strain trials in 1950.
(pp. 54-56).*

Trials were conducted to determine the productivity of new varieties and of different strains of standard varieties. Essex, B 73-18 [Mohawk x (X 96-56)] and Kennebec appear to be the most promising for Delaware; all three are resistant to late blight and possess acceptable market quality.

Florida

*Eddins, A. H., (p. 57).
McCubbin, E. N. and
Ruprecht, R. W.*

Data are presented on the yields of varieties and hybrid seedlings at two localities. Dakota Chief ranked first in both trials but at one centre the experimental error was exceptionally high.

Iowa

*Peterson, C. E., (pp. 58-67).
Hooker, W. J. and
Timian, R. G.*

Common scab is the chief problem of potato production; a variety to replace Cobbler is required. Other diseases receiving attention in the breeding programme include late blight, viruses and ring rot. Breeding methods used are outlined. Techniques for screening seedling progenies for disease resistance are being devised. Seedling inoculation has been found to be an efficient method of testing resistance to late blight. Among the hybrid progenies observed in the field, those involving Min. 113.43-1-45, 6316, Teton and B 962-32 were especially promising.

From the results of yield trials, Cherokee and 6316 are considered to be valuable; the former should be useful on muck soils where scab is serious; 6316 is promising on account of its high percentage of uniform US No. 1 tubers.

Kansas

King, C. L. and (pp. 68-69).
Tinklin, G. L.

In a test in Shawnee County, White Cloud was among the varieties outyielding Irish Cobbler. In quality tests, White Cloud was graded first.

Louisiana

(v. *Southeastern Project* above).

Maine

Bonde, R. (pp. 70-71).

Breeding for ring rot resistance has been carried out since 1940. A number of desirable parents have been found and it is now expected that resistant varieties with desirable plant characters and marketing quality can be bred. Progress has been made in combining resistance to ring rot and late blight.

Bonde, R. and (pp. 72-78).
Merriam, D.

The progeny of certain crosses yield relatively high percentages of ring rot resistant seedlings. Flava and Furor apparently possess genetic factors for ring rot resistance. Information is also provided on the reaction of ring rot resistant seedlings to late blight infection of the foliage and tubers. Seedlings showing no blight infection or only a trace are indicated. None of the seedlings selected for resistance to leaf roll exhibited resistance to late blight tuber rot.

Folsom, D. and *Yield test of leaf roll resistant seedlings at Aroostook*
Merriam, D. *Farm, 1950.* (p. 79).

The low yield and poor quality of many leaf roll resistant seedlings tested at Aroostook Farm indicate that, until better seedlings are developed, leaf roll control will depend upon measures other than use of resistant varieties.

Folsom, D. *Leaf roll resistance, 1950, at Highmoor Farm.*
(pp. 79-81).

A number of leaf roll resistant seedlings were retained for further study. Two of the seedlings which had yielded fairly well were equal to Katahdin in boiling quality.

Libby, W. C. and (pp. 82-83).
Akeley, R. V.

Seedlings and standard varieties were compared for yield and specific gravity at six centres. The new varieties Cherokee and Pungo outyielded Cobbler. B 355-44, resistant to late blight and ring rot, equalled Cobbler in yield.

Simpson, G. W. and *Leaf roll resistant seedlings.* (pp. 84-90).
Bonde, R.

The results of work on the resistance of hybrid and selfed seedlings to leaf roll infection carried by the green peach aphid are tabulated. In 1950, 13.6% of the seedlings tested failed to show symptoms.

Maryland

Jehle, R. A. (pp. 91-99).

Tests have been carried out on new and old varieties from different sources and on promising hybrids from the breeding programme of the US Department of Agriculture, with a view to finding varieties with increased disease resistance and other improvements. The results of tests at several centres are summarized.

Massachusetts

Donaldson, R. and (p. 100).
Kucinski, K. J.

Trials were conducted at Amherst to study 14 named and numbered varieties. Ontario ranked first in yield but probably its superiority was not significant.

Michigan

Muncie, J. H. and (pp. 101-02).
Hatfield, M. R.

Selection of hybrids for scab resistance was effected. Advanced seedling selections from six crosses were tested by commercial growers; further selections of three of the hybrids were made. Tables are given showing (1) the reactions of 42 seedlings to stem and dry rot (*Fusarium Solani* var. *Eumartii*) and (2) the results of specific gravity and alcohol tests on 44 seedlings used in trials of disease resistance.

Wheeler, E. J. and (pp. 103-07).
Moore, H. C.

Breeding work is surveyed. The reclamation of muck soils in southern Michigan has created the need for new varieties adapted to this area. Varieties that store well and have suitable quality are required by crisp manufacturers. Four scab resistant seedlings, B 505-3, B 69-17, R 100-3 and B 93-12-5, were increased in 1950 for growers' trials.

Minnesota

Krantz, F. A. and Potato breeding. (pp. 106-08).
Eide, C. J.

Breeding objectives are listed. Alternate cycles of inbreeding and outbreeding are effected to develop parents with a high degree of homozygosity for desirable characters; F_1 progenies of these parents are tested for superior individuals suitable for introduction as new varieties. The following studies are among those mentioned: analysis of specific gravity of 30 varieties and selections grown at 24 locations for 5 seasons; the relation between specific gravity of parents and that of F_1 progenies; variation in the economic characters of successive selfed generations, and general and specific combining ability of selections from different selfed generations; and vitamin C content of parents and F_1 progeny in relation to yield, maturity and specific gravity of tubers. Breeding for retention of vitamin C during storage appears to be as valuable as breeding for high vitamin C content.

The production of graft produced chimeras as a method of obtaining improved varieties is being explored. Periderms of varieties resistant to common scab, late blight and virus diseases and of varieties with a more desirable periderm texture and colour have been grafted on the best commercial types.

Eide, C. J. and The development of disease-resistant varieties of
Krantz, F. A. potatoes. (p. 109).

The methods and results of testing breeding material and selections for reaction to common scab and late blight are reported. Investigations on physiological races of late blight are under way.

Turnquist, O. C. Minnesota Agricultural Extension Service.
(pp. 113-14).

The results of yield tests at two centres are given. The mid-season selection B 61-3, combining scab and late blight resistance, was among the varieties giving a good performance; its tubers have a paper white skin with the appearance of an artificially waxed potato.

Montana

Afanasiev, M. M. (pp. 115-19).

Varietal trials are reported. Netted Gem and Seneca exhibited a high degree of scab resistance.

Nebraska

Werner, H. O., (pp. 120-30).
 O'Keefe, R.,
 Chapman, H. and
 Sandsted, R.

Two red selections from a cross between Triumph and Nebraska 49.40-3 and a mid-season white segregate are being increased for growers' trials. The former are likely to be of value in central Nebraska to replace Red Warba for early production. The white variety has given good results in central and western Nebraska.

Further breeding is being carried out to obtain segregates with red tubers, scab resistance, good culinary quality and early or mid-season maturity. Approximately 400 clones have been secured which show considerably greater resistance to scab than Triumph; these are to be tested to obtain superior parents.

Wound healing ability of the tubers is under investigation, in view of the fact that tubers of Progress will not heal satisfactorily except under certain environmental conditions. Preliminary results suggest that the healing ability of a line can be assessed by measuring the rate of loss in weight from standardized cut surfaces subjected to controlled conditions. Degree of whiteness of the tuber interior appears to be closely correlated with specific gravity and cooking quality.

Methods of evaluating the heat and drought resistance of clones are being studied. Determination of water retention ability when the plants are supplied by their roots, and of rate of loss in the turgidity of leaf sections cut out of the leaf at different times of the day are promising methods. The relationship between morphological characters and drought resistance is under analysis.

The lines Doe Bay Red and Nebraska 8.38.8 have exhibited a high degree of resistance to tuber damage by flea beetle larvae; seedlings from crosses having either of these lines as one parent are to be studied for flea beetle resistance.

Detailed information on the performance of Cayuga, Chippewa and 19 other commercial varieties is presented.

New Hampshire

Blood, P. T. (pp. 131-32).

Data on the yield and specific gravity of varieties grown at Durham are provided. Of the two numbered varieties tested, B 73-10 yielded well, equalling Katahdin, Green Mountain and other commercial varieties.

New Jersey

Campbell, J. C. (pp. 133-36).

The results of yield trials and analyses of the specific gravity of varieties and selections grown in different districts are summarized. In general Kennebec and Essex are well adapted to central New Jersey.

New York

Blodgett, F. M., Potato scab tests in 1950. (pp. 137-44).
 Roberts, D. A. and
 Natti, J. J.

US seedlings were tested for scab resistance and other characters. No seedling was free from undesirable characters; further tests are necessary.

Hardenburg, E. V., Specific gravity and yields of potato varieties and
 Sawyer, R. and seedlings in New York, 1950. (pp. 145-48).
 Meadows, M. W.

A mealy potato without the drawbacks of Green Mountain is desired; absence of blackening after cooking is also required. The results of tests of seedlings and varieties in several counties are summarized.

Kelly, W. C. (pp. 149-50).

In work on vitamin C content, a marked interaction between season and variety has been noted. No parent has so far been discovered which transmits an exceptionally high vitamin C content to its progeny. Chippewa has transmitted a low vitamin C content.

Livermore, J. R. (pp. 151-53).

The breeding programme includes the development of leaf roll resistant varieties and hybridization of tetraploid forms of certain wild species with seedlings and varieties of *Solanum tuberosum* possessing good quality.

A seedling [(Albion x Katahdin) x Katahdin] with field resistance to leaf roll at Ithaca has been named Canoga.

Progress has been made in developing seedlings resistant to insects; late maturing lines exhibit more resistance than early ones.

Close association between leaf roll resistance and late maturity forms a problem in breeding for resistance to this virus.

Reddick, D. and Peterson, L. C. (pp. 154-55).

Three factors for late blight resistance have been identified in material derived from *S. demissum*. Preliminary data suggest that seedlings have been secured carrying resistance to all three races of the fungus found in the field; a few of these seedlings have given high yields. Resistance to virus Y and leaf roll is receiving attention. Varietal differences in black spot, a condition apparently induced by bruising, have been recorded. Varieties exhibiting marked variation in susceptibility to black spot have been inbred to determine whether susceptibility and mealiness are correlated.

North Carolina

Cochran, F. D. (pp. 156-57).

A brief survey of yield tests on varieties and seedlings is given.

Neilsen, L. W. and Cochran, F. D. (pp. 158-64).

No species of *Solanum* or domestic potato variety has been found to possess a high level of resistance to southern bacterial wilt. Hybrid selections with a certain amount of resistance have been isolated; these are to be given first consideration in future work; more national and foreign introductions are to be studied for wilt resistance.

North Dakota

Baird, W. P. and Howard, G. S. (p. 165).

Data from a variety trial at the Northern Great Plains Field Station, Mandan, are summarized.

Hoyman, W. G. and Mattson, H. (pp. 166-69).

In a trial at Fargo, B 515-2 continued to show a high degree of resistance to scab. Previous observations that B 738-8, ND 457-1 and Kennebec exhibit a low percentage of field infection with virus Y were confirmed.

Hoyman, W. G. (pp. 169-71).

Among 120 USDA seedlings tested at Grand Forks in 1948, B 515-2 and B 738-8 appeared to be the best adapted to the Red River Valley. B 515-2 is equal to Cobbler in yield and is being increased; B 738-8 possesses medium maturity and some resistance to late blight, scab and virus Y; it is to be increased in 1951.

Mattson, H. and Johansen, R. (pp. 172-78).

In addition to yield trials, tests were carried out on the resistance of varieties to puncture pressure and skinning. Crosses were made between selections possessing resistance to

scab, late blight, virus Y or other diseases. Seedlings from various sources were selected for disease resistance.

Ohio

Sleesman, J. P. and Bushnell, J. (pp. 179-81).

Work on the development of insect resistant varieties is in progress; the results of tests on resistance to leafhopper injury in hybrid and selfed seedlings obtained from the US Plant Industry Station, Beltsville, Md., and the Iowa Station are presented.

Pennsylvania

Hartman, R. E. and Akeley, R. V. Wart-immunity tests. (pp. 182-85).

Varieties and seedlings were studied for wart immunity; several showed freedom from infection.

Mills, W. R. (pp. 186-87).

Breeding is concentrated upon late blight resistance. Selections apparently immune from races A, B, C, D and BD have been secured.

Rhode Island

Odland, T. E. and Skogley, C. R. (pp. 188-89).

Data are given on the yield and other characters of 25 varieties tested at Kingston in 1950. Ontario, Essex, Pontiac and B 69-16 significantly outyielded the standard Green Mountain.

South Carolina

Epps, W. M. (pp. 190-92).

In yield trials at two centres, B 76-23 was the most attractive of the three new seedlings included. Tests of quality for crisp manufacture were carried out on Kennebec and Sebago, using different storage temperatures.

Virginia

Andrews, F. (pp. 193-94).

The problem of producing seed stock in southwest Virginia is under investigation.

Parker, M. M. (pp. 195-98).

The production of satisfactory seed stock in eastern Virginia is difficult; improvement work is therefore largely confined to selection of seedlings from other states. The performance of seedlings and varieties tested in 1950 is described.

Washington

Locke, S. B. and Rich, A. E. Virus diseases of potato and other solanaceous plants. (pp. 199-201).

Varieties and seedlings are tested each year for reaction to field infection with leaf roll. No immune varieties have been discovered. So far, the greatest resistance to field infection has been observed in X 1276-185, Calrose and Katahdin; Essex has shown moderate resistance to leaf roll and in addition a high degree of resistance to late blight.

Menzies, J. D. Potato leaf roll resistance test. (pp. 202-06).

Seedlings from Beltsville and elsewhere are being tested for field resistance to leaf roll so that material can be secured for breeding a leaf roll resistant variety to replace Russet Burbank. The results of the 1950 tests on seedlings are reported; B 579-3 may possess field resistance and is a promising seedling in other respects.

Vincent, C. L. *The breeding and development of potato varieties.*
(pp. 207-09).

Breeding for disease resistance and other characters is in progress. In a test of USDA seedlings, 11 exhibited a high degree of scab resistance.

West Virginia

Gallegly, M. E. (pp. 210-12).

Selection work on resistance to late blight and scab is reported.

Westover, K. C. (pp. 213-14).

Information is given on selection for disease resistance at the Reedsville Experiment Farm.

Wisconsin

Hougas, R. W. *Potato Introduction and Preservation Station.*
(pp. 215-16).

The work of the above station is described. Its chief function is to provide valuable genetic stocks of wild and cultivated species of *Solanum* for breeders in the United States.

Rieman, G. H. (pp. 217-19).

The breeding programme comprises: (1) production of varieties with high quality and resistance to diseases, particularly to scab; (2) study of the cytogenetic basis of sterility and crossability; (3) estimation of the breeding value of commercial varieties and seedlings from the United States and abroad and of *Solanum* species; (4) testing of breeding stocks and new varieties in relation to yield, disease resistance, and market and table quality; and (5) determination of the most efficient methods of isolating desirable characters from the varieties among which they are scattered and of their subsequent combination in one or more strains.

Interest in new varieties is centred upon scab resistance and red colour. The results of tests on varieties and advanced selections emphasize the complexity of the inheritance of scab resistance.

Rieman, G. H., *Clonal variations in the Chippewa potato variety.*
Darling, H. and (pp. 220-22).
Hougas, R. W.

Desirable and undesirable clonal variations in Chippewa are described. The clonal selection method is valuable for the control of disease and maintenance of high levels of productivity.

Rieman, G. H., *The occurrence of mycorrhiza-like mycelium in*
Cooper, D. C. and *potato tubers.* (pp. 222-23).
Hougas, R. W.

Evidence has been obtained suggesting that most varieties and strains grown in the United States are infected with a mycorrhiza-like fungus, and that these mycorrhizal associations may be the cause of tuberization.

Wyoming

Riedl, W. A., (pp. 224-27).
Starr, G. H. and
Rincker, C. M.

Tests were carried out on new seedlings for resistance to scab and ring rot and on varieties and seedlings for adaptability, yield and cooking quality. Even if naturally infected seed is planted, certain resistant varieties appear to have the ability to produce plants free from ring rot symptoms. Several lines with good scab resistance and other desirable characters were selected. In yield trials, many seedlings outyielded Bliss Triumph and showed commercial possibilities.

2776.

Potato investigations centralised. New research station.
Commonw. Agric. 1951 : 21 : 28-31.

One of the main objectives of the new potato research station near Healesville, Victoria (cf. Abst. 2811) is the development of varieties adapted to local conditions.

2777.

"Institut de Beauvais". A propos de l'origine de la pomme de terre.
("Institut de Beauvais". A propos of the origin of the potato).
Pomme de Terre Française 1951 : 14 : 3-7.

The historical evidence is examined to discover the origin of the potato "Institut de Beauvais" [Beauvais Institute]. The parents remain unknown, though the variety was produced from seed and multiplied at the Agricultural Institute of Beauvais. It was put on the market in 1884 by this institute and the firm of Vilmorin.

2778.

Conferencia Latino-Americana de Especialistas de Papa. (Latin-
American Conference of Potato Specialists).
Minist. Agric. Ganad., Div. Agric., Est. Exp. Papa, Bogotá 1950 : Pp.
78. (Mimeographed).

In the first section of this conference, under the heading Taxonomy and Cytology, J. G. Hawkes gave an outline of the botanical and cytological classification of the section *Tuberosum* of the genus *Solanum*. C. Vargas C. referred to his collection of 1200 clones of Peruvian potatoes, of which 300 are cultivated types and several are wild species not previously described. They contain pronouncedly xerophytic and strongly hydrophytic types, as well as many intermediates. The speaker supported the view that *S. andigenum* should be regarded as a subspecies of *S. tuberosum*. Further data are supplied indicating that the potato was domesticated in Peru over 5300 years ago and that it spread from there to other countries. C. Ochoa referred to his collection of Peruvian potatoes, which contains some 700 clones of cultivated types. His observations show that the dividing lines between some species, such as *S. Yabari*, *S. stenotomum* and *S. goniocalyx*, are almost impossible to establish and revision is necessary in the classification. A. Montaldo mentioned a full collection of Chilean potatoes which was being classified in collaboration with Hawkes. Among the cultivated potatoes of Chile, forms possessing resistance to *Spongospora subterranea*, *Actinomyces scabies* and *Heterodera marioni* have been discovered. Under the heading Genetics and Breeding, Nelson Estrada R. spoke of the establishment in Colombia of a large collection of Colombian potatoes, comprising 150 cultivated varieties and 5 wild species, together with all the most important types from other countries. Breeding work in Colombia aims primarily at resistance to *Phytophthora infestans*, using *S. demissum*, *S. Andreanum* and *S. malinchense* as sources of resistance; the German blight-resistant varieties *Aquila* and others have proved susceptible in Colombia. Attempts are to be made to breed for early maturity using *S. Rybinii* and early domestic varieties, and for resistance to drought, heat and low altitude using European and north American domestic varieties and *S. Fendleri* and related species. Bolters of certain British varieties have given higher yields than the corresponding normal strains. Experiments have been made on sowing dates, density of planting, size of setts and control of blight by spraying. M. Cárdenas referred to the Bolivian potato collection which comprises 120 local varieties and much valuable material obtained from Britain and the USA. Crosses were made between the two best varieties of *S. andigenum* and between *S. Cardenasii* and *S. capsicibaccatum*, the latter having been reported resistant to *Phytophthora infestans*; the variety *Huaca-lajara* [Cow's Tongue] of *S. andigenum* has also proved resistant to blight in the field. A new station is being founded in Bolivia for potato research. E. Salcedo M. made some further observations on potato breeding in Colombia: frost resistance is being aimed at by crossing the hardy wild species *S. acaule*, *S. depexum*, *S. curtilobum*, *S. Ajanhuiri*, and *S. Juzepczukii* with cultivated varieties of

S. andigenum and *S. Rybinii*. Hybrids of *S. demissum* made for blight resistance will also be tested for frost resistance. A hybrid between two varieties of *S. andigenum*, Jabonilla and Curipampa II, has proved highly frost resistant. C. Ochoa spoke of measures in Peru to breed potatoes resistant to frost; *S. brevicaulis* was named among the frost-resistant species. Hybrids of *S. andigenum* x *S. curtilobum* are promising in quality and yield, though not so much in frost resistance, in which respect the most interesting hybrids are from *S. stenotomum* and *S. Yabari* x *S. sp. aff. multidissectum* and *S. goniocalyx* x *S. Bukasovii*. Crosses of *S. coeruleiflorum*, *S. Chaucha*, *S. acaule* and *S. Juzepczukii* were mainly sterile, though a few berries have been obtained from *S. acaule* x *S. stenotomum*. Some of the hybrids have proved more hardy than *S. curtilobum* and equal or superior to *S. Juzepczukii*, being capable of withstanding temperatures varying between -1° and -3.5° C. J. G. Hawkes gave information on methods used at Cambridge to raise the fertility of different crosses; these included bud pollination, grafting on tomato, and maintenance of high humidity.

In the section Phytopathology and Entomology, E. de Rojas Peña gave an account of the main cryptogamic diseases of the potato in Colombia and the control measures employed. Resistance to *Phytophthora infestans* has been established in *S. Andreanum* and *S. malinchense*. Studies of biological specialization in the fungus have been initiated, with the object of comparing the strains existing in Colombia with those in England and elsewhere. The technique used in testing resistance was described. A. Montaldo reported on the potato disease situation in Chile and expressed the view that the method of testing blight resistance used in Colombia was too severe. J. G. Hawkes stated that blight attacks in Colombia were often severe and a rigorous testing method was therefore necessary. C. Ochoa reported on fungous diseases of potato in Peru. Hybrids resistant to *Ph. infestans* have been obtained from crosses between *S. Antipoviczii* and domestic varieties. Mexican wild species are also being used in crossing. A selection from local commercial potatoes has proved highly resistant to wart. V. Alba R. reported on the virus diseases of potato encountered in Colombia and on observations being made on varietal susceptibility at the potato research station at Usme. In the discussion that followed, C. Ochoa remarked that hybrids of *S. goniocalyx* x *S. sp. aff. multidissectum*, *S. stenotomum* x *S. Chaucha* and *S. Yabari* x *S. stenotomum* are very prone to virus infection. V. Alba R. reported on the chief insect pests of the potato in Colombia. In the discussion, C. Ochoa mentioned that in Peru *S. Abbotianum* is supposed to be resistant to borer attack.

The remaining sessions of the conference were devoted to physiology, seed certification, soils and fertilizers, and future plans. In the last, recommendations were made for exchange of breeding material between different South American countries and for holding an official Latin-American conference to discuss the possibilities of establishing an International (South American) Institute for Potato Research.

2779. HOGEN ESCH, J. A.

De teelt van aardappelen in het algemeen en de teelt en export van poot-aardappelen in het bijzonder. (**The raising of potatoes in general and the raising and export of seed potatoes in particular**).

Jaarb. Algem. Bond Oud-leerl. Middelbaar Landbouwonderwijs, Wageningen 1950 : 57-70.

In addition to information on seed production in and for various countries of Europe, this article contains a short section on how new varieties are bred in Holland and on the importance of resistance to diseases and pests as an aim in breeding.

2780. MÜLLER, K. O.

Über die Herkunft der W-Sorten, ihre Entwicklungsgeschichte und ihre bisherige Nutzung in der praktischen Kartoffelzüchtung. (**On the origin of the W varieties, the history of their development and their use so far in practical potato breeding**).

Z. Pflanzenz. 1951 : 29 : 366-87.

In a historical survey of the research on the W varieties the work is described from the

following aspects: Broili's extensive inbreeding work on the EF strain, which he discovered; the *Phytophthora* resistant genotypes in the EF strain; and the isolation of the *R* gene for *Phytophthora* resistance in practical potato breeding.

The role which the W varieties had in stimulating resistance breeding is also discussed.

2781. FILIMONOV, A. A.

(For a more extensive production of early potatoes).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 1 : 71-72.

[Russian].

The following are regarded as the best of the more recently developed early varieties: Epron, bred at the Leningrad Research Station, Uljjanovskii [Uljjanov] and Vyrypaevskii, both developed at the Uljjanov Potato Research Station, Imandra and Murmanskii [Murmansk] bred at the Arctic Section of the USSR Institute of Plant Industry, Bogarnyi [Rain-fed] and Stepnjak [Steppe] at the Šortandino Research Station, and Severnaja Roza [Northern Rose] at the Falenki Breeding Station.

2782. GLUŠČENKO, I. E.

(The problem of heterogeneity of tissues in plants).

Problemy Botaniki (Problems of Botany) 1950 : No. 1 : 115-48.

[Russian].

Experiments with several varieties of potatoes suggest that the tissues and cells within a single plant organism may be heterogeneous. The technique consisted of developing tubers from adventitious buds, which were induced in various ways. The material was chosen specially from varieties having variegated tubers. The clones of the initial varieties and those developed from tubers with adventitious buds were studied for several generations. The data are tabulated. The differences between the tubers of the experimental plants and those of the controls included higher starch content and greater productiveness in the former. Some of the experimental material was less susceptible to physiological deterioration than the control plants.

The experiments with Zarnica [Lichtblick] showed that all early clones derived from the tubers with adventitious buds gave high percentages of tubers of a different colour. However, later generations of these clones reverted to type. There were individual differences between the clones regarding their capacity to produce tubers of different types and their degree of constancy regarding the new tuber character. In contrast to Zarnica, whose clones showed a continuous increase of reversals to the initial type of tuber, Maika [May] clones in later generations showed increasing percentages of tubers of the changed colour. The clones developed from tubers with adventitious buds of a Kirgizian variety, Roza Kamerzoni, produced different types of tubers including those with red skin and colourless eyes. In later generations all clones except those producing red tubers with colourless eyes reverted to type. In experiments with Čugunka [Cast Iron] minor changes in tuber colour were obtained as a result of induction of adventitious buds. In later generations the tubers of some clones remained constant in respect of the acquired colour of the tubers, while others reverted to type. Tubers with adventitious buds of *S. tuberosum* var. *latum* gave a high percentage of plants with pink-eyed white tubers. The progenies of these clones remained constant in respect of their tuber colour. They also showed changes in leaf characters and produced more and larger tubers than the controls. Changes in leaf character, flowering habit and starch content of the tubers were obtained in Kostromič [Kostroma] as a result of reproduction of the variety from tubers with adventitious buds. The later generations did not revert to type.

Clones showing uniformity in respect of tuber colour were obtained by planting tubers of *S. tuberosum* f. *viridalbifolium* cut into three pieces. Similar results were obtained by cutting and planting the appropriate portions from the tubers of Gladstone, Čugunka and Maika. On the other hand, clones obtained by this method from Mestnyi Sini [Local Blue], a seedling of Rannaja Roza [Early Rose] and a hybrid between Epicure and Centifolia reproduced the initial forms.

2783. CHAPMAN, H. W.
Absorption of CO₂ by leaves of the potato.
Amer. Potato J. 1951 : 28 : 602-15.

Experiments were carried out on differences in absorption of CO₂ between leaves of the varieties Triumph, Irish Cobbler, White Cloud and Progress and on the influence of internal and environmental factors upon variation in absorption of CO₂. It is pointed out that information on metabolic differences between varieties and plant types might be useful in seedling selection. Considerable natural variations in rate of CO₂ absorption were found in paired leaves of the same and different plants. Triumph was significantly lower in CO₂ absorption per unit area than the other three varieties; in view of the effect of leaf turgidity upon photosynthesis, this lower rate is probably associated with the tendency of Triumph to wilt readily and for long periods.

2784. PORUCKIĬ, G. V.
(The effect of different methods of slicing potato tubers upon flowering and tuber formation).
Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1948 : 63 : 757-60.
[Russian].

Differences between plants grown at the Institute of Plant Physiology of the Ukrainian Academy of Sciences from the apical and basal regions of vernalized tubers of Wohltmann Moskovskii [Moscow Wohltmann] are described.

2785. R., L.
(A conference on agriculture in the Moscow province).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 2 : 74-76.
[Russian].

Reference was made to new productive potato varieties, which are resistant to physiological degeneration, developed at the Institute of Potato Farming.

2786. BRAUTLECHT, C. A. and
GETCHELL, A. S.
The chemical composition of white potatoes.
Amer. Potato J. 1951 : 28 : 531-50.

Analyses of the chemical composition of potato tubers grown commercially in Maine have shown considerable diversity between varieties, particularly in starch content, which varies from 8% in some samples of Bliss Triumph to 20% in Green Mountain.

2787. CRAFT, C. C. and
HEINZE, P. H.
Association of specific gravity with weight of individual tubers in late crop potatoes.
Amer. Potato J. 1951 : 28 : 580-82.

Individual weights and specific gravity values of 1400 tubers, representing six varieties and 17 lots, were determined. Tuber weight was not found to have any practical value as an indication of specific gravity, although 4 lots gave significant correlation coefficients for weight and specific gravity.

2788. CARROLL, J. G.
Progress in the New South Wales potato industry through varietal improvement.
J. Aust. Inst. Agric. Sci. 1951 : 17 : 7-13.

Breeding work carried out since 1929 is briefly summarized. Future objectives in respect of improvements in general agronomic characters, yielding ability, cooking and keeping

quality, resistance to drought, heat, frost, insect pests and various diseases are reviewed. It is hoped that international work on breeding improved potato varieties will soon be facilitated by the intervention of FAO.

2789. SIGLE, K.
 Das Kartoffeleiweiss, seine Steigerung und Verwertung. (**The protein of potatoes, its increase and utilization**).
 Z. Acker- u. Pflanzenbau 1951 : 93 : 208-58.

Investigation showed that there is no correlation between the size of tubers typical for a variety and the content of crude proteins or of pure protein, so that breeding for larger tubers is unlikely to increase the protein content of the tuber.

From a study of the amounts of crude proteins, pure protein and starch in various varieties it is concluded that the breeding of varieties showing higher contents of pure protein and starch is likely to be more promising than an attempt to breed for the combination of increased contents of crude proteins and starch.

In future breeding for an increase in crude proteins or in pure protein, the effect of introducing into the crosses some of the wild or cultivated South American potatoes with high protein contents should be investigated, though their low yields are an objectionable characteristic; the fact that the primitive forms are short day plants is another drawback. The possibility that increased protein content may be accompanied by lowered resistance to diseases, and especially viruses, should be noted.

2790.
 Potatissorterna i Sverige. (**Potato varieties in Sweden**).
 Växtodling. Skrifter Inst. Växtodlingslära Kungl. LantbrHögskolan,
 Uppsala 1951 : 5 : Pp. 192.

The Institute of Plant Husbandry of the Royal Agricultural College of Sweden has published the results of an investigation during 1937-43 into the purity of potato stocks and the distribution of different varieties in the provinces of Sweden. With the collaboration of the Agricultural Societies of the various provinces nearly 11,000 samples of 20 tubers each were collected, planted and examined. In the second part of the report, which is concerned with the distribution, purity and authenticity of the different varieties, the names of the breeders are given where known and an alphabetical list of names and their synonyms is appended in a tabulated index.

2791. CASTRONOVO, A.
 Papas Chilotas. Descripciones y clave para el reconocimiento de muestras de papa recogidas en una excursión al sur de Chile. (**Chilean potatoes. Descriptions and a key for the determination of potato specimens collected in an excursion to the south of Chile**).
 Rev. Invest. Agríc., B. Aires 1949 : 3 : 209-45.

Botanical descriptions and figures are given of 113 indigenous cultivated potato varieties collected by the author in southern Chile. A key is appended.

2792. STEVENSON, F. J.
 The potato—its origin, cytogenetic relationships, production, uses and food value.
 Econ. Bot. 1951 : 5 : 153-71.

Sections are included surveying the early history of the potato, expeditions to Mexico and South and Central America to collect breeding material, and cytological information on interspecific *Solanum* crosses.

2793. TURLAPOVA, A. [TURLAPOVA, A. P.].
(New potato varieties).
 Kolhoznoe Proizvodstvo (Collective Farming) 1951 : No. 5 : 34-35.
 [Russian].

A list of important recent Soviet varieties, which have already been described (cf. Abst. 1959), includes Hibiny 3, which has a remarkably short growth period and yields a second crop in the same season when planted with freshly harvested tubers under the conditions of Uzbekistan.

2794. SCUDDER, W. T.,
 JACOB, W. C. and
 THOMPSON, H. C.
Varietal susceptibility and the effect of potash on the incidence of black spot in potatoes.
 Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 343-48.

Wide variation in varietal susceptibility to black spot has been recorded in potatoes grown on Long Island. Black spot is an internal discoloration appearing after bruising and usually following a few months of storage; it appears to be due to a physiological disorder, possibly a nutrient deficiency. Many of the newer varieties show little susceptibility to the disorder. A positive correlation between black spot index and specific gravity has been obtained. Thus high quality, mealy varieties are usually the most susceptible to black spot. Teton and Kennebec are noted as exceptions to this correlation.

2795. HEY, A.
 Über die Schorfresistenz der in der DDR zugelassenen Kartoffelsorten.
(On scab resistance of the potato varieties recommended for cultivation in Germany).
 NachrBl. dtsh. PflSchDienst 1951 : 5 : 86-91.

Tests of 25 German varieties have shown Carnea, Sabina and Jubel to be practically immune to scab. There follows a group of resistant varieties, comprising Ackersegen, Erdgold, Flämingsstärke, Frühnudel and Toni. In the susceptible varieties, the highest degree of infection was not always reached at the same place and there are grounds for supposing that the racial composition of the populations of *Actinomyces scabies* differs in different localities.

2796. STARR, G. H.
Some factors influencing infection by *Corynebacterium sepedonicum* in potato plants.
 Amer. Potato J. 1951 : 28 : 551-58.

Variations in the severity of potato ring rot symptoms on Bliss Triumph were observed at Wyoming Agricultural Experiment Station. Bacterial isolates from susceptible and resistant tubers were equally pathogenic, but after repeatedly using one suspension for inoculation, its virulence diminished. Seed pieces cut directly through at least one eye before inoculation had a higher percentage infection than those cut between the eyes.

2797. BRUYN, H. L. G. DE.
 Het kweken van *Phytophthora*-resistente aardappelrassen. **(Breeding *Phytophthora* resistant varieties of potatoes).**
 Jaarb. Algem. Bond Oud-leerl. Middelbaar Landbouwonderwijs, Wageningen 1950 : 71-78.

A concise account is given of how plant breeders, using artificial infection and hybridization of European varieties and South American and Mexican species of *Solanum*, are trying to obtain *Phytophthora* resistant varieties suitable for consumption. The problem of physiological races of the fungus and the relative importance of leaf and tuber resistance are also considered.

2798. PRJANIŠNIKOVA, E. and POZDNJAKOVA, N.
(The propaganda of scientific achievements at district exhibitions).
 Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 2 : 70-72.
 [Russian].

Mention is made of promising new potato varieties for the Moscow province, including Seedling 4135 and Seedling 9729 and the variety Peredovik [Leading], which shows resistance to wart and bears good quality tubers.

2799. RICHTER, H. and SCHNEIDER, R.
 Untersuchungen zur *Rhizoctonia*-Anfälligkeit der Kartoffelsorten.
(Investigations on the susceptibility of potato varieties to *Rhizoctonia*).
 Züchter 1950 : 20 : 257-66.

A series of German potato varieties was tested in the field and laboratory for reaction to *Rh. Solani*. All proved susceptible. Comparatively slight differences in the degree of susceptibility were noted between varieties, but the reaction of these under field and laboratory conditions respectively often differed.

2800. MONTALDO B., A.
 Producción de semilla de papa. **(Production of potato seed).**
 Agric. Téc., Chile 1950 : 10 : 32-42.

In the course of this article, information is given on the tuber yields of standard potato varieties grown in Chile and of some new varieties bred by the Centinela Experimental Station. C8-2 and 1248 show some resistance to *Heterodera marioni*.

2801. MAI, W. F.
Solanum Xanti Gray and *Solanum integrifolium* Poir., new hosts of the golden nematode, *Heterodera rostochiensis* Wollenweber.
 Amer. Potato J. 1951 : 28 : 578-79.

A method is described by which slight infestations of nematodes can be detected. Readings can thus be made without destroying the plant; the test is therefore valuable in breeding work. *S. Xanti* and *S. integrifolium* were both found to be hosts of *H. rostochiensis*. *S. tuberosum* was the most severely attacked species.

2802. BIANCHI, A.
 La resistenza di *Solanum chacoense* Bitt. a *Leptinotarsa decemlineata* Say e il suo significato per la coltivazione della patata. **(The resistance of *S. chacoense* Bitt. to *L. decemlineata* Say, and its importance for potato cultivation).**
 Genetica Agraria, Roma 1950 : 2 : 309-12.

This note is based on the account of German research reviewed in *Plant Breeding Abstracts*, Vol. XIX, Abst. 2664.

2803. LANGENBUCH, R.
 Beitrag zur Klärung der Ursache der Kartoffelkäferresistenz der Wildkartoffel (*Solanum polyadenium* Greenm.). **[A contribution towards the explanation of the cause of Colorado beetle resistance in the wild potato (*S. polyadenium* Greenm.).]**
 NachrBl. dtsch. PflSchDienst 1951 : 3 : 69-71.

Beetles that had been starved for 48 hours when placed upon leaves of *S. polyadenium* ate only minute portions of the leaf as compared with controls placed on *S. tuberosum* leaves;

they vomited a dark brown fluid soon after eating the leaves; this occurred even when the leaves had been washed with ether or hot water to remove the exudation from the glandular hairs. The noxious substance is therefore contained in the leaf tissue and not in the hairs; it is not a poison, since the number of actual deaths was no more than in the controls, and it is thought to be a substance analogous to demissin.

2804. ARENZ, B.
Der Einfluss verschiedener Faktoren auf die Resistenz der Kartoffel gegen die Pflirschblattlaus. (**The influence of various factors on the resistance of the potato to *Myzus persicae***).
Z. Pflanzenb. Pflanzenschutz 1951 : 2 : 49-62.

Significant varietal differences in degree of infestation by the aphid in open fields have already been demonstrated in three years' observations on 12 varieties at 6 different locations in Bavaria. In the 1950-51 season plants of 17 varieties were grown in pots and 20 aphids placed on each. On some varieties the aphid population multiplied, whereas the aphids left other varieties, which after a period of 9-15 days became quite free. Such varieties, which included Oberarnbacher Frühe [Oberarnbach Early], Ackersegen and Lerche, are therefore considered to be aphid resistant. Varieties having a degree of infestation always above the average included Sieglinde and Adelheid. The influence of other factors such as manuring and state of health on the degree of infestation was also studied.

2805. ARENZ, B.
Weitere Ergebnisse über die Resistenz der Kartoffel gegen die Pflirschblattlaus. (**Further results on the resistance of the potato to *Myzus persicae***).
Z. Pflanzenb. Pflanzenschutz 1951 : 2 : 63-67.

Previous experiments having shown Ackersegen to be one of the most aphid-resistant varieties (cf. Abst. 2805), observations were made to test the nature of this resistance. The rate of multiplication was less and the death rate higher on healthy living plants than on plants suffering from leaf roll or on detached leaves. The resistance effect is thus considered to be related to the physiological state of the plant and not to any poisonous substance that it gives out.

2806. BERCKS, R.
Infektionsversuche mit verschiedenen X-Virusherkünften an mehreren Kartoffelsorten. (**Investigations on infecting a number of potato varieties with different virus X strains**).
Züchter 1950 : 20 : 282-87.

The differential reaction of nine German potato varieties to infection with strains Cs 35, Flava-X, Erstling-X and Kaiserkrone-X of virus X is described.

2807. DARBY, J. F. and
LARSON, R. H.
Variation in virulence of naturally occurring strains of potato virus Y.
Amer. Potato J. 1951 : 28 : 561-62.

Some 22 potato varieties, grown commercially in Wisconsin, are listed with respect to the severity of rugose mosaic symptoms produced after inoculation with 25 isolates of potato virus Y from tobacco and potato hosts in England, New Zealand and USA. Rugose mosaic may either be caused by viruses X and Y existing as a complex of strains each varying in virulence, or, as proved with virus X free potatoes, by virus Y alone.

2808. KAWAKAMI, K.
(Conspectus of investigations on the potato in various foreign countries IV).
 Agric. and Hort., Japan 1949 : 24 : 177-80.
 [Japanese].

Virus researches on the potato in Great Britain are briefly described.

2809. SCHULTZ, E. S.
Intervinal mosaic of potato.
 Phytopathology 1951 : 41 : 564-65. (Abst.).

Symptoms caused by intervenal mosaic in the USA closely resemble those induced by viruses A and X. The disease can be distinguished by varietal specificity; those varieties immune from viruses A and X are susceptible to intervenal mosaic. Reductions in yield have amounted to 13%, 14% and 18% respectively in the varieties Green Mountain, 41956 and Irish Cobbler.

2810. BONDE, R. and
 MERRIAM, D.
Studies on the dissemination of the potato spindle tuber virus by mechanical inoculation.
 Amer. Potato J. 1951 : 28 : 558-60.

Data collected during a study of different methods of inoculation support the opinion of many Maine farmers that Kennebec is more susceptible to spindle tuber infection than other varieties commonly grown in the state. Further investigations of varietal reactions are in progress.

2811.
Potato Research Station officially opened.
 J. Dep. Agric. Vict. 1951 : 49 : 122-23.

The new potato research station of the Victoria Department of Agriculture has been officially opened at Myers' Creek-road, Healesville.

Hybrids produced in conjunction with the Commonwealth Scientific and Industrial Research Organization are being compared with varieties grown commercially in Australia and with several new varieties from New South Wales. Some 600 seedlings bred on the station are being tested for resistance to virus X.

2812. MCKAY, R. and
 CLINCH, P. E. M.
Observations on the inheritance of field resistance to leaf roll of potatoes. (Shamrock x Skerry Champion).
 Sci. Proc. R. Dublin Soc. 1951 : 25 : 225-33.

The varieties Shamrock and Skerry Champion are highly resistant to leaf roll infection in the field but not immune (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1063). Three out of 22 seedling units from the cross between these two varieties showed field resistance to leaf roll, completely escaping infection. Four others contracted less than 50% infection, compared with the 100% infection in the controls. No true immunity occurred; all the seedling units succumbed when exposed to infection by viruliferous aphids. The units could be classified into four broad groups according to the external symptoms produced. Each unit behaved consistently towards infection, whether this occurred naturally in the field or through sprout infection from a single source.

2813. BONDE, R. and
MERRIAM, D.
Potato spindle tuber control.
Bull. Me Agric. Exp. Sta. 1951 : No. 487 : Pp. 15.

Symptoms of spindle tuber in Katahdin, Chippewa and Kennebec are described. Propagation of healthy tuber lines, followed by roguing and other seed plot practices, is the best method of developing seed potato strains free from this virus disease.

2814. BAWDEN, F. C. and
KASSANIS, B.
Serologically related strains of potato virus Y that are not mutually antagonistic in plants.
Ann. Appl. Biol. 1951 : 38 : 402-10.

The results of protection tests at Rothamsted Experimental Station, England, have shown that although the tobacco veinal necrosis virus, isolated from a naturally infected South American plant, is serologically related to potato viruses Y and C, it does not protect *Nicotiana Tabacum*, *N. glutinosa* or potato from infection by these viruses. *N. Tabacum* and *N. glutinosa* infected with either virus Y or virus C are susceptible to tobacco veinal necrosis virus, but the latter virus is unable to multiply normally in potato plants already seriously affected by virus Y, and is generally more virulent towards *Nicotiana* than towards *Solanum* species.

2815. **Potato trials, 1950.**
Mon. Rep. Minist. Agric. N. Ire. 1951 : 25 : 364-67.

Trials of seven main crop varieties of potato were conducted by the Agricultural Advisory Officers in Northern Ireland on the same basis as in former years. Arran Banner and Stormont Dawn gave the highest average yields of 16 tons and 15 tons 8 cwt. per acre, respectively. Ulster Supreme, included for the first time, produced an average yield of 15 tons 7 cwt. per acre. The other variety under trial for the first time was Ulster Leader, but its average yield of only 9 tons 3 cwt. per acre was considerably lower than those of the remaining varieties Arran Peak, Ulster Cromlech and Majestic.

2816. MATTSON, H. and
JOHANSEN, R.
Potato variety trials in North Dakota—1950.
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1951 : 13 : 165-70.

The results of trials of Kennebec, Pontiac, Triumph and seven other varieties are reported. Kennebec outyielded Pontiac and Red Pontiac and had a higher specific gravity (cf. Abst. 2770).

2817. ZELLER, A.
Ergebnisse der Kartoffelversuche des Jahres 1950. (**Results of potato trials for the year 1950**).
VersErgebn. Bundesanst. alp. Landw. Admont 1951 : No. 8 : Pp. 31.

The following information concerning the four early and 21 late varieties tested, in various Austrian districts, is given for each variety: origin, 100 tuber weight, height at the beginning of flowering, susceptibility to diseases of the haulms and of the tubers, number, colour and form of flowers, colour of calyx and of the anthers, shape and size of tuber, the texture of the skin, depth of eye, colour of the flesh, starch content and yield of tubers. Disease resistance of the varieties varied greatly. Especially high percentages of starch were found in the following varieties: Falke, Robusta, Roswitha, Bona, Biene, Jacobi, Agnes, Panther and Vera, in descending order of starch contents, the range being from 20.9% for Falke to 10.7% for Vera.

2818. SMOOT, J. J.

***Streptomyces* isolates pathogenic to sweet potatoes in Maryland.**

Phytopathology 1951 : 41 : p. 565. (Abst.).

Three isolates, designated SP 12, SL 2 and SL 5, obtained from pox infected sweet potatoes and soil proved pathogenic to sweet potatoes in laboratory and greenhouse tests. Both SP 12 and SL 2 resembled *S. ipomoea* but SL 5 differed with respect to several physiological and cultural characteristics.

2819. MOORE, J. E.

Comparison of certain sweet-potato varieties and their high carotene mutants as to susceptibility to disease.

Phytopathology 1951 : 41 : p. 564. (Abst.).

The relative susceptibility of six varieties to scurf (*Monilochaetes infuscans*) and *Fusarium* wilt is not consistently correlated with carotene content; those varieties with high percentage of carotene are more susceptible to pox (*Streptomyces ipomoea*) and show a higher incidence of cracking.

FIBRES

2820. CASTAGNOL, E. and

PHAM-GIA-TU.

Étude des textiles du nord de l'Indochine. (A study of the textile plants of northern Indochina).

Arch. Inst. Rech. Agron. Indochine 1950 : No. 6 : Pp. 35.

Endeavours during 1940-45 in Indochina to increase jute and cotton production showed that these two crops could only be secondary products in Viêt-Nam and Cambodia. At the same time a study was made of other fibre plants, such as ramie and other hardier, wild Urticaceae found in northern Tonkin and in Laos, to discover some textile plant suitable for the central regions of Annam and Tonkin. Among the wild indigenous species a search was made also for some plant with more or less lignified fibre but capable of growing on high lying soils.

The present paper contains much information on laboratory examinations of the technological properties of (1) many more or less lignified plants regarded as possible substitutes for jute; and (2) plants with cellulose, white fibres and belonging to the Urticaceae.

The fibre plant collection at the Tu-Phap Station was to have been used in the study of methods of cultivation but it has probably been destroyed since 1945. Expeditions must therefore be undertaken in the north of Indochina to collect the varieties again and re-form the collections.

2821. O'KELLY, J. F.

Registration of improved cotton varieties.

Agron. J. 1951 : 43 : p. 241.

The recently registered cotton variety Fox, which was selected from a cross between Deltapine 14 and Stoneville 2B, is described (cf. Abst. 1183).

2822.

Progress reports from experiment stations season 1949-1950.

Emp. Cott. Gr. Corp. Lond. 1951 : Pp. 140.

Hutchinson, J. B. Foreword. (pp. 1-3).

The chief advances recently made in plant breeding and other work on the problems of cotton production are reviewed.

Hutchinson, J. B. and Cotton Research Station, Namulonge. Progress report for the season 1949-1950. (pp. 4-11).
Manning, H. L. Programme of work. (pp. 11-19).

The year under review was the first in which breeding work was carried out at the new station at Namulonge, Uganda (Abst. 1185). The collection of upland cottons and their relatives, and a representative range of other races of *Gossypium hirsutum* were planted. In addition, breeding stocks of hybrid origin intended for the transfer of increased staple length to MU 8 were sown, together with East and South African strains for comparison. A scarcity of types from outside Uganda that could compete with BP 52 in yield was noted. Work on BP 52 material consists of two parts: (1) the production of a modal bulk and (2) progeny row breeding. A modal bulk is produced by determining the mean values for the most important characters, then discarding all material deviating from any one of these values by plus or minus an amount exceeding the standard deviation, and repeating this process for several years. In the Sudan this process is termed filtering. The modal bulk has been improved in yield at a rate of approximately 3% per annum in work at Kawanda and recently at Namulonge. In trials of bulks of four of the best progenies from the previous season, strain C(48)4 was superior to the modal bulk in quality but showed little improvement in yield, and C(48)12 outyielded the modal bulk by more than 25% of lint per acre and equalled it in quality.

The long-term breeding programme is discussed. The prospects of developing really heavy cropping varieties for conditions in Uganda depend upon securing upland cottons immune from bacterial blight and highly resistant to *Lygus*. The second stage of breeding work will be the production of lines giving a high ratio of seed cotton to vegetative parts in the pest and disease resistant stocks. Adequate information on fruiting habit and response to environment is required. Breeding lines are being developed which will increase the range of material available for study. In one line of approach, based upon the modern theory of population genetics, a mixture of valuable strains of widely different origin is to be subjected to random intercrossing. In addition to the improvement of BP 52, work on the type S 47 (ex BP 50) for areas east and north of the Nile has been undertaken. The replicated progeny row system has the advantage of yielding data which permit estimation of the rate of progress and of prospects of further advances; the possibility of considerable further improvement in BP 52 has already been demonstrated.

Jameson, J. D. Uganda. Report of the senior botanist, 1949-50. (pp. 20-22).

A historical survey of the methods of estimating blackarm damage and degree of resistance to this disease is presented. The technique of leaf spot grading developed in the Sudan was successfully applied in breeding the resistant variety S 47 (ex BP 50), but the value of the technique is considerably modified under conditions of heavy rainfall. Attention is now being given to the possibilities of seed disinfection, since it has been found that main stem infection in the first two months after germination exerts a critical effect upon yield.

Anglo-Egyptian Sudan. Progress report of the plant breeding stations, season 1949-1950.

Anson, R. R. and Gezira Station. (pp. 25-30).
Barlow, K. C.

Strains of Sakel and X 1730 highly resistant to leaf curl are to be bulked next season.

Knight, R. L. and Shambat Station. (pp. 31-35).
Sadd, J. E.

The production of a Sakel strain, designated BAR 14/21, carrying both the factors B_2 and B_3 for blackarm resistance, was completed; the strain is to be rendered leaf curl resistant by roguing. Transference of the gene B_4 of *G. arboreum* to Evelyn's Selected Sakel has been effected. Work on a second transference of B_4 from *G. arboreum* race *bengalense* to Sakel continued (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2422). In hybridization between Wagad 8 (*G. herbaceum*) and Sakel, the gene for blackarm resistance possessed by the

former was successfully incorporated in the third back cross; the relationship between this gene and B_4 of *G. arboreum* is not yet known. B_5 from the perennial *G. barbadense* type, Grenadines White Pollen, was successfully carried to the fourth Sakel back cross. In addition, work is in progress to develop blackarm resistant strains of American upland. The gene controlling blackarm resistance in Stoneville 20 has been transferred by three back crosses to a sufficiently uniform genotype of Sakel for its value to be determined next season. F_1 generations of Stoneville 20 carrying B_1 , B_2 , B_3 , B_4 or B_5 were grown, so that tests for gene homology can be carried out on F_2 material. The blackarm resistance of *G. anomalum* is recessive; the genetic relationship between blackarm resistance in *G. anomalum* and *G. arboreum* is to be investigated.

In breeding for jassid resistance, it has been found that the full hairiness of some of the most hairy upland cottons can be transferred to the Sakel genotype. The basic gene controlling hairiness in Kapas Purao is H_3 ; close linkage exists between H_3 and one factor of a pair of duplicate genes for chlorosis. In Kapas Purao H_3 is harmless but transference of H_3 to Sakel has so far resulted in chlorotics. The gene H in Pubescent T 611 is the strongest gene for hairiness so far discovered. Work on the transference of hairiness from *G. arboreum*, *G. herbaceum*, *G. mustelinum*, *G. punctatum*, St. Ignatius and Hairy Giza 36 to Sakel also continued. For breeding purposes the gene H_1 has been chosen as the most promising for developing jassid resistant Sakel, because the gene is common to both *G. barbadense* (Tangüis and Carpulla) and *G. hirsutum* (MU 8b and St. Ignatius) and has shown no deleterious effects on lint quality. The attempt to transfer the lint strength of *G. Thurberi* to Sakel continued.

The character of 4-loculed bolls is being transferred from tetraploid *G. herbaceum*, tetraploid *G. arboreum*, and Ferguson (*G. hirsutum*) to the blackarm and leaf curl resistant Sakel strain BLR 14/16, with a view to securing material for selection for high yield. With the same end in view, the number of seeds per locule in Sakel is to be increased by crossing with the "species" *G. auritum*.

Douwes, H. and
Cuany, R. L.

Cytogenetics. (pp. 36-40).

In colchicine experiments, a method has been devised for treating growing points of germinating seeds without damaging the root tip. A doubled hybrid of *G. arboreum* race *bengalense* x *G. Raimondii* is now setting bolls freely; chromosome pairing appears to be fairly normal. Data on the inheritance of leaf shape in material from a cross between the amphidiploid *G. Thurberi* x *G. arboreum* and a Sea Island strain carrying the factor "super-okra" for very narrow leaf shape were confusing; back-crossing to *G. barbadense* x *G. hirsutum* is in progress for further analysis of the genetics of leaf shape.

Crossing of *G. areysianum* and *G. triphyllum* with *G. Stocksii*, *G. somalense* and *G. anomalum* is in progress in order to study interspecific relationships. The chromosome number of *G. triphyllum* has been determined as $n = 13$. Additions to the type collection included *G. Robinsonii*. In crosses involving *G. gossypoides* little success has so far been obtained, except when *G. anomalum* and *G. Thurberi* formed the female parents.

Genetical studies of rogues in Egyptian cotton are in progress.

Study of linkage between B_2 and B_3 has begun with the production of F_1 progenies of interspecific and intraspecific hybrids involving *G. barbadense*, *G. punctatum* and upland. It is suspected that the interspecific linkage test may reveal closer linkage owing to a reduction of crossing-over between nonhomologous segments. Close linkage has been found to break down after three to four generations of back-crossing. Linkages of various characters with the B genes are being sought to facilitate study of the homologies of the B genes; in order to secure clear cut segregations, the characters in question are first brought into the same genetical background by back-crossing to the blackarm susceptible X 1730A. In addition, the genes for blackarm resistance carried by *G. punctatum* types and several other cottons are being investigated by back-crossing with X 1730A. The transference of B_2 and B_3 to Wilds 16 is in progress. Hairiness is being transferred from MU 8b to Wilds 16. Linkage within *G. arboreum* and between *G. arboreum* and *G. herbaceum* with respect to the groups $Lc_1^2 - Li^d - Cu - L$ and $P - Ne$ is to be analysed. Tests are being made of the

homology of the gene for red leaf in Acala Red (upland) and of a gene for mahogany lint in a *G. barbadense* cotton.

Rose, M. F.

Kadugli Station. (pp. 41-48).

Cotton

BAR NT 96/40, an American upland cotton homozygous for B_2 , was crossed with BAR SP 84 with the aim of imparting the robustness and vigour of the former to the latter. BAR 7/8, a blackarm resistant strain of SP 84 carrying B_2 and B_3 , was filtered in an attempt to improve lint length and quality. The material in the breeding plot comprised progenies of SP 84, CL 20-4, MZ 561 and Wilds 11 *ex* Zeidab and bulks of derivatives of U4 x Cambodia and U4 x MU 8. Derivatives of U4 x MU 8 appear to be better adapted to the short growing period of the Kadugli area than the Cambodia hybrids; they are to be subjected to trials in comparison with the best selections of BAR SP 84.

Sesamum indicum

The varieties Kadugli Resistant White and Kadugli Early Resistant White, resistant to the local disease maraud ed dam (*Bacterium sesami*), were maintained.

Vigna unguiculata

Three lots of lubis helu have been retained for bulk propagation: Kadugli 4, a late, red seeded fodder type; Kadugli 3, a mid-season, brown seeded dual purpose type; and Kadugli 47, an early, white seeded grain selection. They are resistant to local leaf mosaic and are suitable for the Jebels area.

Peat, J. E. and
Munto, J. M.

Tanganyika Territory. Lake Province. Progress report for the season 1949-50. (pp. 51-66).

Further promising new jassid resistant strains are under trial at Ukiriguru. UK 48, first issued during the 1948-49 season, outyielded UK 46 in trials and was more jassid resistant; UK 46 is now replacing MZ 561 in commercial cultivation. Hybridization between selections has been initiated. Albar, a bacterial blight resistant stock from Namulonge, is to be used in crosses. Strains were tested for reaction to spraying with bacterial blight suspension. Resistance due to B_2B_2 was entirely inadequate in face of a bad attack; a strain carrying B_2 and B_3 exhibited stem lesions.

Bebbington, A. G. and Tanganyika. Eastern Province. Progress
Disney, H. J. de S. report for the season 1949. (pp. 67-70).

Conflicting results were obtained from the strain trials but two bulks showed promise.

Ducker, H. C.,
Miller, W. L. and
Evelyn, S. H.

Nyasaland. Season 1949-50. Cotton Experiment Station. (pp. 71-74).

The results of trials indicate that commercial Crown Land Bulk invariably outyields the selections in all localities except in the Lower River region, where red bollworm damage eliminates differences between strains. Probably the high degree of genetic variability of the commercial stock makes it more widely adapted than the uniform inbred progenies. A mixture of the best Crown Land selection is therefore to be tested.

McKinstry, A. H.,
James, R. W. and
Long, L. C. H.

Southern Rhodesia. Cotton Research Station, Gatooma. Progress report for the season 1949-50. (pp. 75-79).

None of the new U 4 selections was significantly better in yield and other characters than 9L34, the U 4 strain at present in commercial cultivation. The MU 8 x BP 52² strains from Barberton, A 5851, A 616, A 618 and A 619, although not significantly better than 9L34 in yield of seed cotton and lint, exhibited improvements as regards ginning percentage, lint index and boll weight; analyses of lint quality have not yet been completed. Single plant selections and modal bulks were made from BP 52 and the above mentioned Barberton strains of MU 8 x BP 52². Selection of plants suitable for mechanical picking is in progress.

Pullen, A. R.

South Africa. Agricultural Research Station,
Barberton. Progress report for the season 1949–
1950. (pp. 80–90).

Cotton

A variety trial was carried out to compare strains from MU 8 x BP 52² and U 4/8161 x Sea Island with A 2106, U 4/5143 and BP 52. A 2106 did not outyield all other cottons as in previous tests. As before, none of the U 4 x Sea Island strains equalled the MU 8 x BP 52² selections in yield. The latter also appear to possess better lint qualities. Reselections of progenies from MU 8 x BP 52², U 4 x Sea Island, U 4 x Cambodia, and MU 8 x Tidewater were made. Crosses were effected between healthy plants on *Verticillium* wilt infected soil, involving the Uganda cottons B 181 and KP 28, and selections of 5143, A 2106, MU 8 and progenies of MU 8 x BP 52².

Hibiscus

Varieties of *H. cannabinus* and *H. Sabdariffa* were selected. Infection by rust (*Aecidium Garckeianum*) was heaviest in the Egyptian varieties and only slight in the Brazilian introductions.

Maize

Breeding for resistance to streak virus has been initiated. Crosses of the locally bred, streak resistant maize P x H with standard susceptible varieties of white dent were tested for grain yield and streak reaction. P x H gave the highest degree of resistance; the hybrids exhibited a reaction intermediate between their parents. In cooperation with the Potchefstroom College of Agriculture, inbreds were tested for streak resistance; promising material was collected for future breeding.

King, H. E.

Northern Nigeria. Progress report for the season
1949–1950. Cotton breeding. (pp. 92–100).

Work on the selection of the improved substrain of Allen, Samaru 26C, and other cottons is reported.

Lochrie, J. V.,

West Indies. Cotton experiment stations. In-
troduutory note. (pp. 113–15).

Lochrie, J. V. and
Spence, J. R.

Cotton experiment station. Antigua. Progress
report for the season 1949–50. (pp. 116–25).

The type collection and variable bulks of Sea Island strains were maintained. September plantings of MAI cotton in Antigua and Nevis produce crops with inferior quality; the programme of selection and strain testing has therefore been expanded to find a Sea Island variety with improved quality.

Harper, A. S.

Cotton breeding station—Montserrat. Progress
report for the year 1949. (pp. 126–29).

Selection continued.

Francis, H. A.

Camden Park experiment station, St. Vincent.
Progress report for the season 1949–50.
(pp. 130–34).

The V 135 selection and seed renewal scheme were carried out as in previous years, and further work was done on the VH 8 hybrid material. Strains have been isolated which equal V 135 in spinning value; trials are to be conducted to study the yielding capacity and spinning value of VH 8 hybrid strains and V 125 under the range of conditions found in commercial cultivation.

Peters, R. W.

Queensland. Regional Experimental Station,
Biloela. Progress report for the season 1949–50.
(pp. 135–40).

Jassid resistant strains of Miller were further selected. In spite of heavy jassid infestation these strains showed almost complete immunity, and produced, under nonirrigated conditions, an average yield of 1020 lb. seed cotton possessing excellent quality.

2823. BALASUBRAHMANYAN, R.
Annual Report of the Cotton Breeding Station, Coimbatore, for the year ending 30th June, 1948 Pp. 26.

Progress in the breeding of Cambodia, Karunganni and annual Nadam cotton is reported. Long term breeding aims include resistance to stem weevil, pink bollworm, jassid, red leaf and blackarm.

G. anomalum, *G. taitense* and *G. Darwinii* are being used in breeding for pest resistance and other characters.

The hexaploid between *G. hirsutum* and *G. Raimondii* was crossed with *G. barbadense*, with the final aim of securing tetraploids. Work on the induction of parthenogenesis by crossing hexaploids with cultivated Asiatic cottons and their interspecific hybrids continued. Experiments on the value of hormones in the vegetative propagation of heterotic F_1 hybrids by cuttings are in progress. Seradix B-1 and B-2 have so far been found the most satisfactory substances.

The characters ghost spot, incomplete boll dehiscence and immature lint were subjected to genetical analysis (cf. Abst. 1982).

G. barbadense varieties are being studied for their response to conditions of high soil fertility.

Perennial types are under test.

2824. KHADILKAR, T. R.
Improvement in Khandesh cottons.
Indian Cott. Gr. Rev. 1950 : 4 : 212-26.

From 1932 to 1948 the rough, short staple and low spinning value of the Khandesh varieties (*Gossypium arboreum*) have been gradually improved by the development of new forms which are also resistant to wilt. The variety 197-3 (Jarila x NR 5), described in detail, is estimated to give 30% more profit per acre than Jarila. Since 1948, further hybridization between 197-3 and other varieties has been carried out.

2825. CRUZ, E. E. and
BARTOLOME, R.
Cotton in the Philippines.
Philipp. J. Agric. 1949 : 14 : 307-21.

Reference is made to the following promising hybrids obtained by crossing the local variety Kapas Purao with Ashmouni and Sea Island, introduced by the College of Agriculture, Los Baños, Laguna: Ashkarao 7 (Ashmouni x Kapas Purao), Kapland 15 and Puland 3 (Sea Island x Kapas Purao).

2826. PATEL, G. B. and
THAKAR, B. J.
Cotton improvement through interspecific hybridization.
Indian Cott. Gr. Rev. 1950 : 4 : 185-98.

The principal results obtained by interspecific hybridization at the Agricultural Research Station, Surat, since 1937 are summarized.

Chromosomally balanced fertile progeny, produced by back-crossing the sterile hybrids of *Gossypium hirsutum* x *G. arboreum* or *G. herbaceum* with American species, such as *G. hirsutum* and *G. barbadense*, have responded well to selection for yield; some have shown superior staple length and ginning percentage compared with their parents. Second and third back crosses with American species have resulted in progeny with very high ginning percentage and extra long staple combined with adaptability to Indian conditions. Certain derivatives from second back crosses combine desirable economic characters with a high degree of resistance to thrips. Other sources of thrip resistance have been found in the derivatives of the synthetic tetraploid from the cross (Co. 2 x 1027 ALF)² x *G. Armourianum*, and in *inter se* crossing between fertile back crosses. The jassid resistance

of the wild *G. tomentosum*, which may depend on hairiness, has been incorporated into the *G. hirsutum* complex by back-crossing; this characteristic also increases drought resistance.

2827. BALASUBRAHMANYAN, R. and
SANTANAM, V.

The inheritance of 'dwarf' mutants in *G. arboreum* race *indicum*.

Indian J. Genet. Pl. Breed. 1950 : 10 : 56-61.

Factorial analysis of four dwarf mutants, which occurred in bulk plots of *Gossypium arboreum* race *indicum* at Coimbatore and Narasaraopet, has been completed in respect of plant habit and lint colour from observations on F_1 , back cross and F_2 populations resulting from numerous crosses involving the variety 2919 of *G. herbaceum* var. *acerifolium*, the varieties Sanguineum and Cocanadas 1 of *G. arboreum* race *indicum*, and the four mutants Coimbatore dwarf, Cocanada dwarf, Anakapalle dwarf and 1767 dwarf. Coimbatore dwarf behaves as a monogenic recessive in both *G. arboreum* and *G. herbaceum* crosses. Anakapalle is also a simple recessive to normal and behaves in a complementary manner with Cocanada dwarf; lint colour and plant habit are inherited independently. Cocanada dwarf and 1767 dwarf exhibit heterosis when intercrossed; they may represent independent gene mutations at the same locus but each has different modifiers. The symbols d_a and d_b were given to Cocanada dwarf and Anakapalle dwarf, respectively.

2828. BALASUBRAHMANYAN, R.

Inheritance of 'meristic variant'—a mutant in cotton.

Indian J. Genet. Pl. Breed. 1950 : 10 : 62-66.

A meristic variant SX_{439} (cf. *Plant Breeding Abstracts*, Vol. IX, Abst. 585) of *Gossypium arboreum* race *indicum* was crossed with cultivated varieties and selected mutants of *G. arboreum* races *indicum*, *bengalense* and *sinense* and *G. herbaceum* var. *acerifolium*; segregation was observed in first and second generation back crosses. The meristic factor m behaves as a simple recessive to the normal M and probably originated as a single point mutation. No linkage was found between m and other recessive mutants affecting petal colour, glabrousness, lintlessness and leaf lobing. The second generation of the cross between the meristic variant (m) and the female sterile type 1281 (s^{fs}) contained a single individual with a suppressed gynecium. The ovary was generally absent in this mutant form, but when present there were always less than 3 loculi. By crossing the meristic variant (m) with the "no ovary" mutant (g) the interaction of two recessive characters having opposite effects on the number of loculi is seen; it is assumed that the genetic constitution of the "no ovary" mutant is Mg and that of the meristic mutant is mG . The F_2 population contains a ratio of $9 MG : 3 Mg : 3 mG : 1 mg$ individuals. Since the phenotypic effects of m are indistinguishable in association with g , m is considered to be epistatic to g . Although all three recessive defective characters m , s^{fs} and g affect the gynecium they are of independent origin. It is suggested that the tendency to produce additional defective characters is increased by a genetical background of recessive defectives.

2829. BALASUBRAHMANYAN, R.

A mutant in Asiatic cotton.

Curr. Sci. 1950 : 20 : p. 73.

A true breeding narrow-leaved mutant, strain SX 507, has been induced by X ray treatment of seeds of *Gossypium arboreum* race *indicum* at Coimbatore. SX 507 has been crossed and back-crossed with the parent strain. The F_1 was intermediate but the F_2 showed a segregation ratio such that the mutation may either have been in a dominant direction from i to I or, assuming the factor concerned to be of an inhibitory nature, in the recessive direction from I to i . Further crosses are being made for confirmation of either hypothesis; these include several between SX 507 and other narrow-leaved forms of Asiatic cotton.

2830. LHUILLIER, J.
Le coton en A.O.F. (Culture sèche). Les possibilités de production et le programme des recherches envisagées par l'I.R.C.T. [**Cotton in French West Africa (Non-irrigated cultivation). Possibilities of production and the research programme contemplated by the IRCT**].
Cot. Fib. Trop. 1950 : 5 : 107-20.

In this programme of the Institut de Recherches du Coton et des Textiles Exotiques [Research Institute for Cotton and Exotic Textile Fibres], five cotton zones are enumerated with notes on their ecological conditions; suitable varieties for various regions; and the location of the experimental stations. Some indications are given of possible lines that might be followed in future cotton improvement.

2831. LOMBARD, P.
Les recherches agronomiques concernant la culture du coton à l'Office du Niger. Première partie. L'amélioration de la plante. (**Agronomic investigations regarding the cultivation of cotton in the Niger Colony. Pt. I. Improvement of the plant**).
Cot. Fib. Trop. 1950 : 5 : 95-105.

An outline is given of the attempts that have been made to introduce cottons suitable for selection work in the Niger Colony. In 1945 it was decided (1) to replace all mass selected lines by pedigree selections; (2) to introduce new varieties into the cotton collection; and (3) to breed new varieties by hybridization. The methods used in this programme are described; its aims are to breed productive pure lines of the sympodial type and yielding fibre of good quality, well adapted to the environment and early enough to allow irrigation to be stopped in February.

Details are given of an extensive hybridization programme begun in 1946 to increase the fibre length of the Allen cottons, while preserving their climatic adaptation to the Niono region. Egyptian cottons, e.g. Maarad, Sakel x 1550 and Giza, have been crossed with lines of American types such as Allen and N'Kourala. In attacking the problem of blackarm resistance, back-crossing has been adopted and lists are given of 1946 crosses back-crossed in 1947 and of 1948 crosses, in which Egyptian selections of genetically known content as regards blackarm resistance were used.

Interspecific hybridization has also been tried, using the Budi cottons, an Asiatic type from crossing between *Gossypium arboreum* var. *cernuum* and *G. arboreum* var. *neglectum*, and amphidiploid cottons as parents. In 1948 one plant from Budi x Egyptian was obtained but remained sterile in spite of colchicine treatment at different stages of growth. Up to 1946 a number of pedigree selections of Allen and N'Kourala had been isolated. These lines differ morphologically and in earliness, length of flowering and harvest periods, but resemble each other closely in fibre quality.

2832. BRIXHE, A.
Le coton au Congo Belge. (**Cotton in the Belgian Congo**).
Cot. Fib. Trop. 1950 : 5 : 1-34.

Though dealing mainly with various aspects of research on cotton production in the Belgian Congo, this article contains a short review of selection and breeding from the time of the introduction of the varieties Triumph, Big Boll, Allen Long Staple, and Stoneville, which was successfully acclimatized and purified by Lecomte at the Bambesa Station (Inéac), until the introduction of the famous U4, originally from the Transvaal. Crosses of U4 by Triumph gave the Gar hybrids, selections from which are gradually replacing Triumph in the southern cotton area.

Mention is also made of the establishment of the Lubarika Selection Station at Kivu and the introduction of Morogoro 998 seed, a selection made in Tanganyika from lines derived

from U4. By 1945-46 the Lubarika station had succeeded in producing the high yielding variety 14/125 with good quality of lint and a fibre yield of 33-34%. The problem of wilt resistance has also been kept in mind.

2833. FOSBERG, F. R.

The American element in the Hawaiian flora.

Pacific Sci. 1951 : 5 : 204-06.

This discussion of the flora of Hawaii includes a criticism of the conclusion reached by Hutchinson *et al.* concerning the origin of *Gossypium tomentosum* (cf. *Plant Breeding Abstracts*, Vol. XVIII, p. 183). These authors have suggested that *G. tomentosum* and the two widely cultivated American species form a closely related group arising by hybridization between an Asiatic cotton and a wild diploid American cotton, following prehistoric introduction of an Asiatic cotton into America; and that *G. tomentosum* was then carried back to Polynesia and Hawaii by Polynesian travellers. The present writer regards it as unlikely that the Polynesians would have been interested in an economically useless species such as *G. tomentosum*, and also finds little morphological similarity to suggest close relationship between this species and the cultivated American cottons.

2834. MCNAMARA, H. C. and

PORTER, D. D.

Heritable abnormalities in cotton and their segregation ratios.

J. Hered. 1950 : 41 : 311-15.

Three types of abnormal plants in Upland cotton are described, each of which depends upon a single semidominant gene or chromosomal aberration that behaves as a single gene. When homozygous the gene pair concerned is semilethal and results in sterility.

2835. KHAN, A. H. and

AFZAL, M.

Vicinism in cotton.

Indian Cott. Gr. Rev. 1950 : 4 : 277-39.

A complete review is given of investigations concerning the extent of natural crossing, carried out at Lyallpur, Pakistan; the results have already been summarized in *Plant Breeding Abstracts*, Vol. XX, Absts 1761 and 1763 and Vol. XXI, Absts 441 and 446.

2836. ARUTJUNOVA, L. G. and

GUBANOV, G. JA.

(Studies of fertilization in cottons).

Agrobiologija (Agrobiology) 1950 : No. 6 : 94-99. [Russian].

Experiments with several varieties of cottons at the USSR Scientific Research Institute for Cotton are reported. The pollen tubes of variety 36M2 developed better after pollination with mixed pollen from whole flowers than with pollen from several anthers or a single anther. In variety S-460 a higher percentage of bolls developed and the seed weighed heavier when pollen from many plants was used than when pollen from a single flower or 40 to 100 pollen grains from a single plant were used. Pollination with large amounts of pollen gave healthier and more productive seed. For instance, F-137, a *Gossypium barbadense* variety resistant to gummosis, gave progenies susceptible to the disease, and S-460 gave progenies more susceptible to wilt when pollinated with small amounts of pollen.

Analyses showed that more pollen tubes penetrated the ovules when the plants were cross-pollinated than when they were selfed. The embryos and endosperms of the inter-varietal hybrids developed more rapidly than those of self-pollinated plants. Biochemical analyses of the reproductive organs of S-460 showed some differences between the selfed and cross-pollinated plants.

2837.

Hybrid cotton coming: but probably not soon.

Better Crops with Plant Food 1951 : 35 : p. 40.

It is mentioned that male sterile plants have been found at the University of Georgia, the discovery of which opens up the possibility of the production of hybrid cotton by natural crossing.

2838. BREGETOVA, L. G.

(The ascorbic acid content of cotton leaves).

Bot. Ž. (Bot. J.), Moskva 1951 : 36 : 34-38. [Russian].

The dynamics of accumulation of ascorbic acid in the leaves of *Gossypium barbadense* and *G. hirsutum* was studied at Stalinabad. The material included a *G. barbadense* variety, 504 "v", whose leaves had a remarkably high ascorbic acid content. This variety is more productive than other varieties and shows resistance to *Fusarium*. It was obtained by interspecific hybridization at the Vahskaja Breeding Station.

2839. SEN, D. L.

Technological Reports on Trade Varieties of Indian Cottons, 1950.

Technol. Bull. Indian Cott. Comm. 1950 : Ser. A : No. 75 : Pp. 91.

The report is presented of the results of spinning tests on samples of 29 representative commercial varieties of Indian cotton and three varieties of East African cotton from the 1949-50 crop.

2840. GOLDOVSKIĬ, A. M. and

PODOLJSKAJA, M. Z.

(Variation in gossypol content of some species of the genus *Gossypium*).

Bot. Ž. (Bot. J.), Moskva 1951 : 36 : 54-59. [Russian].

Quantitative variation of gossypol and its relation to the oil content of cotton seed were investigated at Leningrad in different species of cotton. American cottons included two varieties, 2836 and 2850, from *G. barbadense* x *G. peruvianum*.

Analyses showed that *Gossypium herbaceum* had the lowest gossypol content and the highest oil: gossypol ratio and *G. barbadense* the highest gossypol content and the lowest oil: gossypol ratio. Other species were intermediate in these respects, the maximum and the minimum oil contents of one species sometimes falling within a range of values characteristic of another species.

2841. RAJARAMAN, S. and

SEN, D. L.

Measurement of fineness of cotton fibres with the help of air permeameter.

Indian Cott. Gr. Rev. 1951 : 5 : 18-32.

A new instrument, by means of which a reliable value for mean fibre weight per unit length of cotton can be obtained, is described. The method is based upon the phenomenon of permeability to the flow of air through a porous plug of cotton.

2842. BALASUBRAHMANYAN, R.,

RAMASWAMY MUDALIAR, V. and

SANTHANAM, V.

Inheritance of lint colour in Cocanadas cotton.

Indian J. Genet. Pl. Breed. 1950 : 10 : 67-71.

The inheritance of lint colour and its relation to fibre length have been analysed from the progeny of crosses and back crosses between varieties of *Gossypium arboreum* races *indicum*,

bengalense, *sinense* and *burmanicum*. The high degree of variability in the colour expressed by the light brown (Lc_2) genotype in Cocanadas 1 is considered to be an effect of the environment, which causes fading on exposure, rather than the modifying action of minor lint colour genotypes (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1067). It is suggested that the genotype (Lc_2^B) of Cocanada pure lines 123 and 129, which has not been previously recorded in Peninsular forms of *G. arboreum*, indicates some affinity between the races *sinense* and *indicum*, and contributes favourably to the possibility that the area in which Cocanada cotton is grown may be the centre from which *G. arboreum* originated (cf. Abst. 1982).

2843. PATEL, S. J. and
PATEL, P. K.

Some factors influencing ginning percentage and fibre characters.

Indian Cott. Gr. Rev. 1951 : 5 : 33-43.

Ginning percentage and fibre properties of the cottons Kalyan, Wagotar and Local Wagad are discussed in relation to different localities and to seasonal factors. Fibre length is unaffected by locality. A positive correlation has been found between ginning percentage and fibre weight in respect of locality; environmental factors influencing fibre weight thus require investigation. Fibre weight is known to be highly correlated with fibre maturity. Accordingly, it is suggested that irrigation and the salts in the soil may affect fibre weight by influencing fibre maturity: a study should be made of these factors.

2844. ILTIS, J.
Le coton au Maroc. (Cotton in Morocco).
Cot. Fib. Trop. 1950 : 2 : 73-83.

In addition to a note on the history of the introduction of cotton into Morocco, some information is given about the varieties brought in from the Ivory Coast, Egypt, America, Algeria, the Riff and Turkestan. Special mention is made of the merits of Pima 67 and the varieties Acala Rogers and Cokers 100.

2845. L'activité de l'I.R.C.T. pendant la campagne 1948-1949. (The work of the IRCT* during the 1948-49 season).
Cot. Fib. Trop. 1950 : 2 : 45-49.

The Textile Section of the Agronomic Research Centre at Rabat, Morocco, has obtained from Pima 67 cotton an early selection SF 6 with fibre 38.7 mm. long and a moderately good yield. Hybridizations included Pima 67 x Egyptian varieties, Pima 67 x 1515 (*Gossypium peruvianum*) and Pima x cleistogamous Tangüis.

Colchicine treatment of flax seed is being tried to avoid the difficulty of sterility in tetraploids. In connexion with hemp improvement, varieties from Morocco, France, Italy, Turkey, the Lebanon and Bulgaria have been tested for yield.

Other fibre plants have been studied to see whether early lines with a good yield of seed and superior fibre can be obtained.

The cotton improvement work carried out in French West Africa at the stations at Bouaké, M'Pesoba-Koutiala (Sudan) and Anie Mono (Togo) has included selection and trials of various strains, hybridization, and the collection or introduction of new varieties. A similar programme is being followed in French Equatorial Africa at the stations at Tikem and Bebedjia in the Chad district, at the Bambari, Gambo and Bossangoa stations in the Oubangui regions, and at Madingou Station in the Central Congo.

At Tikem, Allen selections from Nigeria, Samaru 26C, belonging to the Tika group, and also Allen Zaria have proved superior in various respects to N'Kourala and Indigenous Allen.

* Institut de Recherches du Coton et des Textiles Exotiques [Institute for Research on Cotton and Exotic Fibre Plants].

A series of other fibre plants are being studied botanically and from the standpoint of future selection. Some promising hairy cotton selections have been made at Tikem for jassid resistance.
At Bombari and Bossangoa disease and jassid resistance are noted.

2846. MAY, A. W. S.
The cotton jassid problem in Queensland.
Qd Agric. J. 1950 : 7 : 24-32.

Reference is made to the possibility of obtaining jassid resistant strains of cotton in Queensland by selection from varieties already being cultivated, in addition to the initiation of a breeding programme to develop resistant varieties.

2847. THIERS, H. D. and
BLANK, L. M.
A histological study of bacterial blight of cotton.
Phytopathology 1951 : 41 : 499-510.

An investigation of the relative penetration of resistant and susceptible host tissues by *Xanthomonas malvacearum* has been carried out at Texas Agricultural Experiment Station, using the varieties Stoneville 20 (resistant), Acala, D & PL, Coker 100 Wilt and Stoneville 2B (susceptible) and the hybrids Stoneville 20 x D & PL and Stoneville 20 x (Stoneville 2B x Rogers Acala). There were no essential differences in the preliminary development of the disease on different hosts except in the number of bacteria and the extent of the lesion. Restricted subsequent development in resistant tissues appears to be influenced by a physiological incompatibility between host cells and bacteria.

2848. BALASUBRAMANYAN, R. and
KESAVA IYENGAR, N.
The problem of jassids on American cotton in Madras with special reference to black soils of ceded districts.
Indian Cott. Gr. Rev. 1950 : 4 : 199-211.

Results of investigations concerning jassid (*Empoasca devastans*) injury in Madras include details of the reactions of numerous American varieties. Under different cultural conditions Mysore American 2 has shown a consistently high degree of resistance, comparable with Cambodia 2 from Coimbatore and MU 8 from Indore. The influence of the rate of development of epidermal hairs, the degree of succulence and cultural factors on the type of reaction is being determined by increased work on these three varieties.

2849. DORASAMI, L. S. and
SRINIVASA IYENGAR, G.
Acclimatization of Egyptian cottons in Mysore.
Indian Cott. Gr. Rev. 1951 : 5 : 1-13.

The results of trials carried out by the Irwin Canal and Babbur Farms indicate that commercial cultivation of Egyptian cottons may be possible in Mysore State.

2850. ROSE, M. F.
The Nuba mountains cotton crop: some factors affecting yield.
Emp. Cott. Gr. Rev. 1951 : 28 : 103-13.

The performances of Pump Scheme, NT 96/40 and SP 84 (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1262) at Kadugli Experiment Station, Anglo-Egyptian Sudan, are discussed. Reference is made to the need for improving cultural methods before more prolific strains are developed.

2851. REMUSSI, C.
La producción de lino textil en la Argentina. (**The production of fibre flax in Argentina**).
Ciencia e Investigación, B. Aires 1951 : 7 : 51-64.

This general review of fibre flax production in Argentina includes a short account of locally bred varieties.

2852. MAIOROV, D. M.
(**The seed growing of flax**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 : 5-7. [Russian].

A return to former methods of seed growing in thickly planted fields is advocated. In the Mičurinite view, growing flax for seed in thin rows for several years has an adverse effect upon its heritable properties, notably its fibre yield.

2853. FLOR, H. H.
Flax variety mixtures.
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1951 : 13 : 191-94.

Trials have been carried out at Fargo, N. Dak., to determine the relative yields of B 5128, Dakota and Sheyenne when sown separately and in mixtures. Only in 1 test out of 53 has a mixture yielded as much as the highest yielding variety. The yield of a mixture usually approximated the average of the two constituents.

2854. TOCHINAI, Y. and
TAKEE, G.
Studies on the physiologic specialization in *Fusarium Lini* Bolley.
J. Fac. Agric. Hokkaido Univ. 1950 : 47 : 193-266.

On the basis of cultural, morphological and pathogenic characters, 41 strains of *F. Lini* were grouped into 10 physiological forms. The flax varieties used in studying the pathogenicity of the strains comprised Pernau 1, Saginau 1 and Taikim. Three mutants of the fungus were tested for their pathogenicity; they tended to be less virulent than the parent strains.

2855. BARBIERI, R.
Sullo stato attuale della canapicoltura campana e sulle sue possibilità di sviluppo. (**On the present position of hemp cultivation in Campania and the possibilities of developing it**).
Ann. Fac. Agr. Portici Univ. Napoli 1948-1949 : 17 : 202-43.

This paper, which deals mainly with hemp cultivation in Italy, contains a short section on the hems grown there and their suitability for different regions. Mention is also made of the need for high quality fibre and of the advances made in hemp breeding in Russia and America.

The value of the new variety *Cannabis sativa* var. *albicata* Jann. for large scale cultivation is being investigated.

In the Bologna district Bonvicini has isolated some promising lines of hemp and the Southern Research Centre for Hemp is studying some lines of the variety Carmagnola to obtain uniformity in plant height and length of internodes as well as pronounced rib formation among other features. Other problems to be investigated relate to simultaneous ripening of male and female plants, plant height, adaptation to environment, earliness, monecism, vegetative multiplication and the induction of mutation by treatment with plant hormones and alkaloids. The cross Paesana [Native] x Pelosella will provide the initial material for breeding earlier hybrids.

2856. SUSTRINA, V. E.
(**Intervarietal natural open pollination of central Russian hemp**).
Agrobiologija (Agrobiology) 1950 : No. 6 : 100-03. [Russian].

Economic properties of all varieties but Kamenec-Podoljskaja [Kamenec Podol] tested at the Penza Province Agricultural Research Station improved as a result of intervarietal natural open pollination.

Staro-Oskoljskaja Uluščennaja [Improved Staryi Oskol] freely cross-pollinated for one, two and three years, grew as uniformly and had as tall stems as the superélite of the initial variety. Mestnaja [Local], Trubčevskaja, Novgorod-Severskaja, Zolotonošskaja [Gold Bearing] and JuSLOS* developed more uniformly and produced taller stems as a result of natural open pollination for one or more years than the initial varieties.

The results of state trials with Staro-Oskoljskaja Uluščennaja and JuSLOS are reported. They indicate that hybridization increases productiveness in hemp.

2857. CRUZ, E. E.
(**Jute industry in Pakistan and New India**).
Philipp. J. Agric. 1949 : 14 : 323-33.

This account of jute cultivation in Pakistan and India refers to work at the Dacca Agricultural Farm, East Bengal, where crosses and selections of promising strains are being made within the species *Corchorus capsularis* and *C. olitorius*. Dacca 154 and Fanduk are two strains produced by this station. Chinsurah Green, which is highly resistant to water-logging and has a high yielding capacity, was derived from *C. olitorius* at the Chinsurah Agricultural Farm in West Bengal.

2858. FURUEDA, K.
(**Ramie cultivation in view of the prohibition of hemp cultivation**.
I.).
Agric. and Hort., Japan 1949 : 24 : 195-98. [Japanese].

In the course of this general account of ramie cultivation, brief notes are included on the choice of suitable varieties.

2859. ARNAL, C.
Existence d'un gradient de sexualité chez *Salix sepulcralis*. (**The existence of a gradient of sexuality in *S. sepulcralis***).
Act. 68 Congr. Ass. Franç. Avanc. Sci. Clermont-Ferrand 1949 : 2-3.

S. sepulcralis, which is considered to be the hybrid *S. alba* x *S. babylonica*, is normally androgynous and, according to the writer, the distribution of male and female flowers on the different catkins is not at random. The succession of female, mixed female and male and purely male flowers, found along the long axis of the branches, represents a series of variations which may also be repeated if the length of the branch permits; the gradient of sexuality is therefore of the multinodal type.

SUGAR PLANTS

2860. TSENG [CHÊNG], P. M. and
CHENG [CHÊNG], T. C.
(**Report on newly bred varieties of sugar cane**).
Kan Chê Yen Chiu (Sugarcane Research), Taiwan 1950 : 4 : 85-92.
[Chinese].

PT 46-156 (PT 41-1114 x F 108) is outstanding for its high sugar yield. PT 46-256 (PT 41-1010 x PT 43-32) is recommended for combining good yields of sugar with a steady growth rate which reduces losses from wind breakage.

* Južno-sozrevajuščaja Luninskoj Opytnoj Stancii [Southern-maturity from Lunino Research Station].

2861. LEE [Li], T. T.

(**The new sugar cane variety PT 43-52**).

Kan Chê Yen Chiu (Sugarcane Research), Taiwan 1950 : 4 : 107-33.
[Chinese].

A full description is given of the new variety PT 43-52. It outyields standard varieties in Taiwan, is resistant to mosaic and fungal leaf diseases, and is less liable to typhoon damage than existing commercial types.

2862.

Proceedings of the First Biennial Conference of Sugarcane Research Workers in the Indian Union, Coimbatore, January 1951.

Part I. Abstracts of Papers.

Dutt, N. L.

The present cane varietal position in India.
(pp. 17-18).

The regional distribution of varieties of sugar cane grown in all states of the Indian Union during the 1948-9 season is recorded. New varieties which show promise are Co. 449, Co. 467 and Co. 475 in tropical areas, Co. 617 and Co. 622 in northern regions, Co.S 245 in western Uttar Pradesh and Co.L 9 in the Punjab.

Dutt, N. L. and

Thuljaram Rao, J.

Progeny tests of inheritance of pith in sugarcane seedlings. (p. 27).

The results of studies on the inheritance of undesirable pith at Coimbatore have shown that progeny from the varieties Co. 244, Co. 301 and Co. 508 possess solid cores.

Part II-1. Papers read in the Agricultural Section.

Aggarwal, D. C. and

Kishore, G.

Sugarcane varietal position in the western tract of the Uttar Pradesh. (pp. 53-58).

The superior characteristics of the varieties Co.421, Co.453, Co.S. 245 and Co.S. 321 are described and compared with those of Co. 312 which still occupies over 70% of the total sugar cane acreage in the Uttar Pradesh province, although it is highly susceptible to red rot, shows a tendency to lodge and gives a relatively low yield under ideal conditions.

Bose, R. D.

Sugarcane development in India. (pp. 128-38).

Details are given of a five year sugar cane development scheme, initiated by the Indian Central Sugarcane Committee; the developments so far achieved in the provinces of Uttar Pradesh, Bihar, Bombay, Madras, Punjab (I), West Bengal and Madhya Pradesh are presented in tabular form. Varieties recommended for each province are listed.

Rao, N. V. M.,

Narasimhan, R. L. and

Anjireddy, D.

Studies in quality of jaggery. (pp. 143-51).

A chemical analysis of the juices of two standard varieties, Co. 527 and Co. 419, with respect to the quality of jaggery prepared from them has been undertaken in the Anakapalle state. Results have shown that Co. 527, having a low percentage of total non-sugars and chlorine, combined with a high phosphate content, produces a more desirable form of jaggery than Co. 419.

Part II-2. Papers read in the Botany Section.

Dutt, N. L. and

Narasimhan, R.

Starch in the genus Saccharum and its interspecific and intergeneric hybrids. (pp. 4-10).

A qualitative investigation of the starch content in the internodes of various species of *Saccharum* and allied genera at the age of 5 and 12 months has been carried out at Coimbatore.

The genus *Erianthus* is characterized by large quantities of starch; *Sclerostachya* and *Narenga* are starch-free at maturity, while the genus *Saccharum* shows a wide range from

S. Barberi with a high starch content decreasing progressively in *S. spontaneum* and *S. sinense* to *S. officinarum* and *S. robustum* in which starch is absent. All *Saccharum* species contain starch, in varying quantities, during young growth stages. It has been suggested that the starch-free *S. robustum* and *Sclerostachya* are possible ancestors of *S. officinarum*; the presence of small quantities of starch in the mature selfs of the latter species and its intraspecific hybrids indicates that a starch accumulating form also may have been involved in the *S. officinarum* complex.

S. Barberi and *S. sinense*, which are thought to have arisen by apomixis from *S. officinarum* x *S. spontaneum*, may have inherited a tendency towards starch accumulation from the *S. spontaneum* parent.

Mukerjee, S. K. *Variability in Saccharum spontaneum L. and its use in sugarcane breeding.* (pp. 19-22).

Variations found in 125 types of *S. spontaneum* collected in southern and eastern India are briefly described. The extent to which natural hybridization has occurred is to be investigated by genetical analysis, and it is hoped that characteristics such as adaptability to adverse ecological conditions and resistance to diseases will be incorporated from these forms in future breeding programmes.

Krishnaswami, M. K. *Floral abnormalities in certain seedlings of S. spontaneum L.* (pp. 22-27).

Numerous sexual abnormalities were produced from intervarietal crosses of *S. spontaneum* comprising SES 49 x Co. 49 and SES 50 x Co. 419 at Coimbatore. Such abnormalities are prevented by avoiding the use of *S. spontaneum* as a female parent.

Narasimhan, V. R. and Thuljaram Rao, J. *Comparative study of the stem epidermis of Coimbatore canes in cultivation.* (pp. 28-41).

Detailed descriptions are given of cork anatomy in the stems of 24 Co. varieties, with a key by which each can be identified on this character alone.

Thuljaram Rao, J. *Anatomical characters of stem in relation to rind-hardness and borer attack in sugarcanes.* (pp. 41-47).

An investigation carried out at Coimbatore concerning the relative development of vascular tissue and lignified parenchyma in the stems of twelve varieties of sugar cane has revealed a positive correlation between the toughness of the stem and varietal resistance to stem borers.

Lal, K. N. and Mehrotra, O. N. *Physiological basis of drought resistance in sugarcane.* (pp. 33-40).

During 1946, a comparative study of drought resistance was made at Banares with 13 sugar cane varieties, by considering cell indices, growth characteristics, water relations, osmotic pressure, glucose percentage and other characters. These measurements can be used to assess the drought resistance of material in the nursery more readily.

Krishnaswami, M. K. *A note on the inheritance of ligular process in certain seedlings of Saccharum spontaneum L.* (pp. 41-46).

Studies were carried out on the inheritance of ligular processes in crosses of POJ 213, B 6308 and Mauritius 1237 with male *S. spontaneum* parents. Those male parents without ligular processes produced similar progeny. B 6308 was the only female parent which transmitted long ligules to its progeny.

Raghavan, T. S. *Some aspects of recent cytogenetical work in sugarcane.* (pp. 47-54).

Variations in selfed and hybrid populations, absence of Mendelian segregation, unpredictability of breeding results and the impossibility of recovering certain types are discussed

and listed as consequences of the heterozygous polyploid nature of the sugar canes cultivated in India. The phylogenetic relationships of *Sclerostachya*, *Narenga* and *Erianthus* to species of *Saccharum* may be revealed by suggested back-crossing techniques.

Subba Rao, K. S. and Raghavan, T. S. *The genus Erianthus: some cyto-taxonomic considerations.* (pp. 55-60).

The cytology of three morphologically distinct groups in *Erianthus* and the consequences of frequently producing gametes with unreduced chromosome number are discussed.

Part II—3. Papers read in the Plant Protection Section.

Dutt, N. L. and Hussainy, S. A. *A note on the breeding and testing of sugarcane varieties resistant to three major diseases with particular reference to red rot.* (pp. 46-55).

The relative values of laboratory and field techniques designed to assess the reaction of seedlings to red rot, smut and mosaic have been estimated at Coimbatore by using some 30 progeny of Co. 213. Resistance or susceptibility was expressed as a percentage of the standard susceptibility of Co. 213. Each seedling from crosses between red rot and smut resistant varieties can be tested for its reaction to both diseases. Breeding is being continued to obtain varieties with combined resistance.

2863. BEATTIE, R. H.
Notas sobre las cañas nuevas del Central Isabel, Media Luna. (**Notes on the new canes of the Isabel Centre, Media Luna**).
Bol. Ofic. Asoc. Téc. Azucar., Cuba 1951 : 9 : 445-47.

Descriptions are given of Media Luna 3-18 and 4-17, both seedlings of POJ 2878 x SC 12/4, of certain other sugar canes of the same parentage, of one from POJ 2878 x Co. 213 and finally of one from Media Luna 3-18 x Media Luna 4-17.

2864. **Sixteenth Annual Report of the British West Indies Central Sugar Cane Breeding Station, Barbados, for the year ending September 30th, 1949** : Pp. 46.

Detailed information is presented concerning a large number of crosses, seedling selections and trials, carried out at the Central Sugar Cane Breeding Station, Barbados, and the performance of selected seedlings in Antigua, British Guiana, Barbados, St. Kitts, Trinidad and Jamaica. Promising third year seedlings included B 45267, B 41211, B 41227, B 4362, B 43337 and B 43391. In the ratoon trials, B 4425 and B 4466 produced good quality juice under certain conditions. B 41211 has been outstanding in all the trials of selected seedlings and is recommended, with the varieties B 41227 and B 43391, for commercial planting in Barbados.

2865. KING, N. J.
The importance of new cane varieties.
Aust. Sug. J. 1951 : 43 : 111-15.

The influence of improved varieties on sugar production in Queensland is discussed. Hybridization is in progress to develop varieties suitable for marginal land, where increased hardiness is required, and for tropical areas in the north.

2866. RAGHAVAN, T. S.
Cytoplasmic inheritance in *Saccharum*.
Curr. Sci. 1951 : 20 : 138-40.

Probable cases of cytoplasmic inheritance in interspecific hybrids involving *S. officinarum*, *S. spontaneum*, *S. Barberi* and *S. robustum*, in which habit and thickness of stem are

affected, are discussed. In a study of interspecific and intergeneric crosses, evidence of maternal inheritance of male sterility has so far been obtained only when *S. spontaneum* forms the female parent. The data suggest that male sterility is the result of interaction between the genes for bisexuality, when in the heterozygous condition, and the cytoplasm.

2867. CHÊNG, C. F. and
LIN, J. T.
**(Observations on the morphology of young sugar cane varieties
in Taiwan).**
Taiwan Sug. J. 1949 : 2(1) : 145-57. [Chinese].

A comparative study is presented on the morphology of the stems and leaves, number of stems per stool, stem height, proportion of dead stems, leaf length and breadth, shape of the dewlap, and pigmentation of the stem of a series of Taiwan varieties belonging to the F series.

2868. ARTSCHWAGER, E.
The role of the ligule in sugarcane taxonomy.
Amer. J. Bot. 1951 : 38 : 144-46.

Ligule structure has been studied in clones representing *Saccharum officinarum* and four other species, with a view to determining its taxonomic value. The basic pattern of the ligule is constant for a given clone and thus provides a basis for the separation of clones. Ligule structure varies considerably within varietal and specific limits and is valuable taxonomically when considered in conjunction with other features. The pubescence of the ligule is especially useful and suffices to separate clones of *S. sinense* from those of *S. Barberi*.

2869. CH'EN, C. C.
(Raw sugarcane juice and the manufacture of sugar).
Taiwan Sug. J. 1949 : 2(1) : 139-44. [Chinese].

Data are included on the quality of the juice of some of the important varieties grown in Taiwan.

2870. KING, N. J.
The cultivated and wild canes of New Guinea.
Cane Gr. Quart. Bull. 1951 : 14 : 116-19.

The former use made of wild sugar canes, indigenous to New Guinea, for incorporating hardiness, vigour and early maturity into varieties bred in Queensland is described. It is hoped that additional sources of desirable material, resistant to Fiji and downy mildew diseases, will be discovered in New Guinea during the Queensland Sugar Bureau's expedition to the lowland Mekeo district and the highland region west of Lae in 1951.

2871. MUNGOMERY, R. W.
**The importance of foreign varieties and recent importations into
Queensland.**
Cane Gr. Quart. Bull. 1951 : 14 : 155-58.

Sugar cane varieties imported during the past two years from other sugar growing countries and neighbouring Australian states are being grown under quarantine conditions in Queensland. Their progress will be observed during the next few years, when they will be on trial in different localities. Several specimens of *Saccharum robustum* are undergoing similar restrictions before incorporation in the breeding programme.

2872. YANG, T. H.
(Studies on the mutual relationships between the volume and productivity of sugar cane stems).
 Taiwan Sug. J. 1949 : 2(1) : 114-38. [Chinese].

Extensive data are provided on the relation between height, diameter, volume and weight of the stems of a series of sugarcane varieties grown in Taiwan.

2873. CHANG, H.
(Studies on interplanting sugar cane).
 Rep. Taiwan Sug. Exp. Sta. 1950 : No. 6 : 14-41. [Chinese].

It is noted that early maturing canes can be more successfully interplanted with spring rice than late varieties.

2874. COLEMAN, R. E.
Studies on the keeping quality of sugarcane following injury by freezing temperatures during 1950-51.
 Sug. Bull. N.O. 1951 : 29 : 198-203.

Data are presented concerning the keeping qualities of 12 varieties of sugar cane, grown commercially in Louisiana, after exposure in the field to temperatures below freezing point. Although the subsequent harvesting treatment influenced the rate of deterioration, CP 44/101 proved superior with respect to purity and acidity.

2875. WANG, C. C.
(Studies on hollow stem of sugar cane).
 Taiwan Sug. J. 1949 : 2(1) : 96-113. [Chinese].

The condition known as hollow stem is brought about by various circumstances, especially faulty supply of water and nutrients during growth. Varietal differences in susceptibility are considerable and are described in the course of the paper.

2876. HUTCHINSON, P. B. and
 DALE, W. T.
A serious sugar-cane disease in British Guiana.
 Nature, Lond. 1951 : 167 : p. 998.

A disease with internal and external symptoms resembling those of leaf scald (*Xanthomonas albilineans*) is now widespread in British Guiana. The varieties B 34104 and D 14/34 are affected both as plants and ratoons. Isolations of the causal organism have been made and successfully reinoculated. Policies of control are being devised, and a trial to determine varietal resistance has been established.

2877. HUGHES, C. G.
Testing sugar-cane varieties for resistance to downy mildew disease.
 Cane Gr. Quart. Bull. 1951 : 14 : 163-66.

The method of undertaking downy mildew resistance trials in Queensland is outlined. Approved varieties are divided into five classes according to their reaction in recent tests, supplemented by information from commercial plantings.

2878. RAFAY, S. A.
Another strain of *Physalospora tucumanensis*.
 Curr. Sci. 1950 : 19 : 385-86.

Further types of *Ph. tucumanensis* are described, as the result of studies at the Central Sugar Cane Station, Pusa. Data are given of the reaction of 15 sugar cane varieties to

one of these types, a new strain designated D, the varieties being graded according to the linear spread of infection in 30 days after inoculation.

2879. McM., A.
Experiment station activities.
S. Afr. Sug. J. 1951 : 35 : 202-03.

Reference is made to sugar cane trials at Doornkop, where several promising N : Co. varieties, including 291, 310, 339 and 349, have shown resistance to red rot. Trials are continuing at Mwavini for smut resistance.

2880. HIRSCHHORN, E.
Un nuevo método de infección artificial con el carbón de la caña de azúcar. (**A new method of artificial infection with sugarcane smut**).
Rev. Invest. Agríc., B. Aires 1949 : 3 : 335-44.

Seven methods of inoculating sugar cane varieties with *Ustilago scitaminea* for testing resistance were studied. The method recommended for breeders involves soaking pieces of cane, each with a bud, in a dense suspension of chlamydospores or sporidia, and then subjecting them to a partial vacuum for 15-20 minutes to expedite penetration.

2881. HUGHES, C. G.
Yellow spot disease.
Cane Gr. Quart Bull. 1951 : 14 : 103-05.

During the 1950 season the occurrence of yellow spot (*Cercospora Kopkei*) on sugar cane was recorded for the first time in North Queensland. The varieties Trojan and Eros were highly susceptible; although the pathogen was observed in fields of POJ 2878, SJ 4 and Badila, it was difficult to find on the varieties Pindar, Q 44 and Q 50, which presumably have some degree of resistance.

2882. DICK, J.
Insect pests in Natal cane. No. 3: Coleoptera, Lepidoptera and mites.
S. Afr. Sug. J. 1951 : 35 : 169-77.

Detailed accounts of sugar cane insect pests are given. To maintain the relative insignificance of insect damage it is important that promising new varieties should be tested for insect resistance before their release.

2883. LIU, S. P.
(**Studies on sugar cane mosaic. I. Evidence of physiological races**).
Rep. Taiwan Sug. Exp. Sta. 1950 : No. 6 : 72-98. [Chinese].

Four strains of mosaic have been differentiated in Taiwan, named short stripe, necrotic, yellow stripe and fine stripe, respectively. The cane varieties F 108, POJ 2883, Co. 281, 35-119 and 35-1347 are promising differential hosts. Details are given of varietal susceptibility to the four strains.

2884. FORS, A. L.
Notas adicionales sobre la caña "Pepe Cuca". (**Additional notes on the Pepe Cuca cane**).
Bol. Ofic. Asoc. Téc. Azucar., Cuba 1951 : 9 : 475-78.

Further information is provided on the field performance, yield and juice quality of Pepe Cuca (cf. Abst. 1209); the variety is resistant to mosaic.

2885. ADSUAR, J.

Preliminary report of a mosaic disease of the resistant sugar cane variety Mayagüez-336.

Tech. Pap. Univ. P.R. Agric. Exp. Sta. 1950 : No. 7 : Pp. 9.

Efforts to transmit a mosaic disease, discovered in Puerto Rico during 1949 on the previously resistant variety Mayagüez 336, to other commercially grown varieties have been unsuccessful. Experimental results show that the virus does not readily infect Mayagüez 336; of 104 plants inoculated, 4 became infected. Similar tests indicate that sorghum is equally susceptible to the isolate from Mayagüez 336 and to the common mosaic virus. Differences between the two forms of mosaic virus are being investigated.

2886. MUNGOMERY, R. W.

Mosaic disease in South Queensland.

Cane Gr. Quart. Bull. 1951 : 14 : 167-68.

The need for ensuring that only healthy canes are propagated is emphasized since the mosaic susceptible varieties Trojan, Pindar and Q 50 have become increasingly popular in the principal sugar growing areas.

2887. HUGHES, C. G. and

SKINNER, S. O.

Leaf-scald disease in North Queensland.

Cane Gr. Quart. Bull. 1951 : 14 : 150-51.

The control of leaf scald can be effectively achieved by planting only resistant varieties of sugar cane, such as Comus, Eros, Pindar or Q 50.

2888. EDGERTON, C. W.

Forty-two years of sugarcane disease research at the Louisiana Agricultural Experiment Station.

Bull. La Univ. Agric. Exp. Sta. 1950 : No. 448 : Pp. 31.

The work of the pathology department during this period is briefly summarized. Diseases which received most attention are red rot (*Phylospora tucumanensis*), root rot (*Pythium arrhenomanes*) and the mosaic virus; other minor cane diseases, including the deterioration of cane varieties, have been investigated. Those problems requiring future study are discussed with reference to the need for continual production of new varieties which are resistant to diseases already prevalent and any new strains which may arise.

2889. LEE [Li], T. T. and

SU, C. C.

(Advanced comparative test of varieties).

Kan Chê Yen Chiu (Sugarcane Research), Taiwan 1950 : 4 : 61-75.

[Chinese].

In a test of eight varieties at P'ingtung, three, PT 43-52, PT 46-85 and PT 46-64, are noted for their superior yield of sugar.

2890. PARTHASARATHY, S. V.

Annual Report of the Sugarcane Research Station, Gudiyattam (North Arot District), for the year 1947-48 : Pp. 12.

The results of trials of Coimbatore sugar cane varieties, carried out at the Gudiyattam Station, Madras, are summarized.

2891. PARTHASARATHI, S. V.
Annual Report of the Sugarcane Research Station, Anakapalle
(Visakhapatnam District), for 1947-48 : Pp. 37.

Sugar cane

Trials of Coimbatore varieties were conducted at the above station, Madras. Varietal reactions to early shoot borer (*Argyria sticticraspis*), red rot (*Colletotrichum falcatum*) and smut (*Ustilago scitaminea*) are under investigation. Attention is being given to physiological races of *C. falcatum*.

Other crops

Tests of selections of ragi (*Eleusine coracana*), ganti (*Pennisetum typhoideum*), sorghum, rice and gingelly (*Sesamum indicum*) are reported.

2892. KING, N. J.
Q.28 and Q.50.
Cane Gr. Quart. Bull. 1951 : 14 : 159-60.

Increases in the yield of sugar cane per acre in the Mackay district of Queensland are correlated with the rapid and widespread acceptance of Q 28 and Q 50 by growers. The outstanding qualities of these varieties are briefly enumerated. Older types still survive on the rich alluvial soils, however, as both Q 28 and Q 50 produce rank growth and lodge easily under such conditions.

2893. MYATT, O. W. D.
Q.55 in the Bundaberg area.
Cane Gr. Quart. Bull. 1951 : 14 : 111-12.

The sugar cane variety Q 55 (POJ 2725 x Co. 290) has recently been grown more widely in the Bundaberg area of Queensland where it shows vigorous growth and ability to produce high quality sugar under adverse environmental conditions. Its reliable performance on drier soils in addition to resistance to stem rots, downy mildew and mosaic diseases have led to its inclusion on the approved variety list for 1951.

2894. MCFARLANE, J. S. and
PRICE, C.
Recent developments in sugar beet breeding.
Spreckels Sug. Beet Bull. 1951 : 15 : 18-19, 22-23.

Recent work in sugar beet breeding in the western United States is reviewed. Efforts are now being concentrated upon incorporating the characters of high sugar content, resistance to bolting and downy mildew, and single germ seed in curly top resistant varieties; the value of hybrid varieties is also being explored (cf. Abst. 2895).

2895.
Proceedings of Sixth General Meeting of the American Society of
Sugar Beet Technologists 1950 : Pp. 728.

Bockstahler, H. W., *Further studies on the inheritance of black root*
Hogaboam, G. J. and *resistance in sugar beets.* (pp. 104-07).
Schneider, C. L.

A study was made of the performance of inbred lines and their F_1 hybrids when planted in soil naturally infested with *Aphanomyces cochlioides* in Minnesota and Michigan. Hybrids between susceptible lines did not differ significantly from their parents in average root yield per plot. Hybrids from resistant x susceptible matings each outyielded the susceptible inbred parent, although in some cases the difference in yield was not significant. The results confirmed the conclusion reached on previous experiments, that resistance to *A. cochlioides* is inherited as a dominant character.

Lawlor, N. (Jun.) and Doxtator, C. W. *Breeding for resistance to root rot caused by Sclerotium rolfsii.* (pp. 108-10).

Breeding for resistance to *S. Rolfsii* is being carried out by the American Crystal Sugar Company, Clarksburg, Calif. In two replicated tests significant differences have been obtained in percentage survival between individual mother lines, between mother lines and the parent variety American 5 forming the control, and between a mass selection and the parent variety. Differences in survival between these American 5 selections for resistance and the control were similar in both tests. As a result of obtaining such data, work on breeding for resistance is being considerably expanded.

Doxtator, C. W. et al. *1948-1949 progress in breeding sugar beets for resistance to Aphanomyces root rot.* (pp. 111-15).

Recently work on selection for resistance to *A. cochlioides* has been extended to include sugar beet for the Red River valley in Minnesota and North Dakota and for north-western Montana. Selections for these new areas, derived from American 3 and US 33, have not been sufficiently resistant to withstand severe attacks of the disease. Crosses are now being made between these selections and highly resistant selections of American 1. In work on the development of resistant sugar beet for northern Iowa and southern Minnesota, selections have been made since 1946. In a test in Iowa comprising elite stocks of these selections, the 1949 selection of American 1 was significantly higher in yield than the 1946 selection, under root rot conditions of medium severity.

Wood, R. R., Brewbaker, H. E. and Bush, H. L. *Cold resistance in sugar beets.* (pp. 116-21).

Preliminary data have been secured which suggest that (1) sufficient genetic variability exists between and within lines to provide a basis of selection for cold resistance at both the seedling and mature plant stages; (2) correlation between frost resistance and sugar content is sufficiently close to enable the breeder to achieve improvements in both characters by selection for cold resistance only; and (3) varietal differences exist in ability to germinate at low temperatures. A portable refrigeration equipment for use in selection is described.

Pack, D. A. and Owen, F. V. *Viability of sugar beet seed held in cold storage for 22 years.* (pp. 127-29).

Seed kept under commercial cold storage conditions for 22 years showed a germination percentage of 75%, which is a reduction of only 10% compared with the germination of the unstored sample in 1928. In tests carried out for three seasons, plants have exhibited normal vigour and sugar content after 18 to 20 years of seed storage. The significance of these results to sugar beet breeding is discussed.

Price, C., Stewart, W. S. and Erickson, L. C. *Some effects of plant growth regulators on bolting and other responses of sugar beets.* (pp. 130-36).

Foliage sprays containing 2,4-D reduced bolting in plants of US 22 and SL 753. A few plants treated with a 50 p.p.m. 2,4-D spray did not show the severe epinasty and longitudinal cracking of the petioles usually produced in addition to the retarding effect upon bolting; these have been selected for further study and possible breeding for resistance to 2,4-D. The effect of 2,4-D upon sucrose production and quality requires further investigation.

Dahlberg, H. W. *Chemical methods for breeding sugar beets.* (pp. 137-38).

Chemical methods of selection used at the Great Western Sugar Co., Denver, Col., are described. Recently, a high negative correlation between sugar content and sodium content of the root has been obtained. It is considered that selection for minimum Na content may be valuable in reducing variability of sugar content and eliminating individuals low in sugar. The importance of uniform conditions of light, temperature and

nutrition in selection by chemical methods is stressed; use of nutrient solutions is therefore planned. In addition, work has been carried out on the pigments of the leaves but large differences between varieties with different sugar contents have not been detected; it is, however, thought that when more is known of the chemistry of photosynthesis, analysis of leaf pigments may be of value in breeding.

Rietberg, H. *Soil structure in relation to beet growth.* (pp. 139-43).

Soil structure is discussed in relation to breeding, on the basis of experience in the Netherlands. It is considered that success in breeding for root shape under conditions in the Netherlands depends upon the structure of the soil. It is also thought that field tests for resistance to bolting are insufficiently reliable because of the influence of soil heterogeneity upon bolting. It is further suggested that in breeding varieties for early drilling more attention to soil structure in relation to emergence and early growth is required.

Doxtator, C. W. and *Sodium and potassium content of sugar beet*
Calton, F. R. *varieties in some western beet growing areas.*
(pp. 144-51).

A standard spectrophotometer technique for determining Na and K content is described. Varietal differences were found in root yield and in percentages of sucrose, Na and K. Interaction between variety and locality was not significant. Domestic varieties were generally lower in Na content than the foreign control varieties. Wide intravarietal differences in Na and K contents were obtained. High yield and high percentages of Na and K were positively correlated. Sucrose percentage was negatively correlated with Na and K contents. Positive correlation was noted between Na and K contents.

Swink, J. F. and *A bolting oddity in sugar beets.* (pp. 152-54).
Doxtator, C. W.

A bolter which produces a seed stalk directly after emergence of the seedling occurs occasionally in hybrids involving selection M 35 of American 1. The inheritance of this character is under investigation.

Savitsky, V. F. *Monogerm sugar beets in the United States.*
(pp. 156-59).

Two selections, designated SLC 101 and 107, have been found in the variety Michigan Hybrid 18, which are considered to be true monogerm sugar beets. The fruits are non-shattering, round and very uniform. Plants of these two races show a late bolting tendency and are highly self fertile. Monogerm seeds give rise to normal seedlings. Races 101 and 107 possess a type of branching new to the genus *Beta*. Either a lateral branch or a single fruit is borne in the axil of a leaf. Other selections for the monogerm character show new types of leaf development and branching: N 100 branches in a similar manner to *B. lomatosogona*; the progeny of N 27 exhibit the heritable feature of seedlings with three cotyledons. In races 101 and 107 monogerm fruit and branching type are recessive characters.

A genetical study of monogerm races is being conducted at Salt Lake City, Utah, including the cause of the correlation of monogerm fruits with late bolting tendency and with types of branching and leaf development. A comprehensive breeding programme has been initiated with races 101 and 107 at Salt Lake City, and at Salinas, Calif. Use is to be made of the back-crossing technique to incorporate the monogerm character in commercial varieties. Problems arising in connexion with the self fertility of monogerm beets are briefly indicated. Races 101 and 107 have been extensively crossed with curly top resistant varieties; it is hoped that a sufficient amount of élite monogerm seed will be available for the initiation of commercial plantings by 1952-53.

Savitsky, H. *Embryology of mono- and multigerm fruits in the*
 genus Beta L. (pp. 160-64).

Embryological investigations have shown that the inflorescence in *Beta* spp. is a panicle and not a spike. In all subspecies and varieties of *B. vulgaris* the panicle bears multiple

fruits or seed balls. In *B. patellaris* and *B. procumbens* the panicle bears umbels; in spite of the monogerm character the development of fruits in these two species is similar to that of the multiple seed balls of *B. vulgaris*. In *B. lomatogona* and monogerm selections of sugar beet the panicle bears simple fruits, considered to be truly monogerm in origin; only these two groups are therefore valuable for the development of monogerm varieties.

Kohls, H. L. *A genetic study of 17 F₁ hybrids and their inbred parents.* (pp. 165-70).

Hybrids involving 17 inbred strains were compared with their parents to study the degree of accuracy with which F₁ performance can be predicted. Of the 17 inbreds, 15 were used as male parents; the remaining 2 were male sterile and therefore formed the female parents. The data showed that the yielding ability of the F₁ hybrids cannot be predicted from knowledge of the yields of the parent inbreds. Sugar percentage, purity and root smoothness are intermediate between the two parents and can be predicted fairly accurately. Resistance to *Cercospora* leaf spot can be predicted only to the extent that an F₁ hybrid usually resembles its less resistant parent in reaction to the disease.

Kohls, H. L. *Evaluation tests in 1949 of hybrid 125.* (pp. 171-72).

Tests of hybrid 125 in 25 localities have indicated that it is well adapted in the eastern area of sugar beet production; in some districts in this section the hybrid has significantly outyielded the local commercial variety. Hybrid 125 was developed by the use of cytoplasmically inherited male sterility.

Peterson, D. F. and *Hybrid combinations among mother line progenies.* (pp. 173-75).
Cormany, C. E.

In improvement work by the Holly Sugar Corporation six mother lines were selected for superiority in sugar production per acre, greater emphasis being laid on sucrose content than tonnage. In 1949 tests were carried out on the six sibbed mother lines, all possible hybrids between the six lines, and the parent variety Holly 13. Four of the hybrids significantly outyielded both parents in sugar per acre; seven hybrids significantly outyielded one parent. In sucrose percentage the six mother lines averaged 0.54% above the parent variety; no expression of hybrid vigour was obtained in sucrose percentage. All the hybrids except one exceeded both parents in root yield per acre. The results indicate that consideration of all possible hybrid combinations between selected mother lines is important. Theoretically, a synthetic variety composed of the six lines studied should show 11.44% increase in sugar production compared with the original variety.

Stewart, D. *Sugar beet x Beta procumbens, the F₁ and back-cross generations.* (pp. 176-79).

Usually F₁ seedlings from crosses of *B. vulgaris* as female parent with *B. procumbens*, *B. patellaris* and *B. Webbiana* do not survive beyond the second or third leaf stage. One F₁ plant from a cross with *B. procumbens*, however, survived and produced flowering branches. The plant was pollen sterile but monogerm seeds were produced by application of sugar beet pollen. Two pollen sterile BC₁ plants were secured. The single BC₂ plant obtained grew only to the flowering stage. *B. procumbens* and allied species may be useful as sources of important genetic characters, such as resistance to nematode and diseases. The view is also expressed that *B. procumbens* and allied species possess truly monogerm seed.

Deming, G. W. *Recent results with sugar x red garden beet hybrids.* (pp. 180-83).

F₃ hybrid varieties, produced from crosses between sugar beet and red globe garden beet, and their advanced generations generally exceeded the commercial sugar beet control variety in root yield; in sucrose percentage they were usually lower and seldom differed significantly from the commercial variety in yield of sugar per acre. The results suggest that a selected F₃ hybrid variety, having the advantage of improved root characters, could

be increased for commercial use, since further selection did not materially alter the performance of the hybrids.

Murphy, A. M., *Performance of three male-sterile sugar beet*
 Ryser, G. K., *hybrids. (pp. 184-86).*
 Smith, C. H. and
 Owen, F. V.

The F₁ hybrids, SL 6105 (male sterile line of US 35 x inbred CT 9), SL 6106 (male sterile line of US 41 x CT 9) and SL 7101 [male sterile form of CT 9 x SL 72 (curly top resistant line from US 22/3)] have exhibited the favourable characters of increased yield in sugar per acre compared with US 22/3, smooth clean roots, and resistance to curly top and to petiole and crown rot. These hybrids are not at present available for commercial use. The problems and possible value of using inbreds in hybrid combination with cytoplasmically male sterile lines are discussed.

Campbell, S. C. *Methods of utilizing the male sterile factor in sugar*
 beet seed production. (pp. 187-90).

Experiments carried out by the West Coast Beet Seed Company on the production of hybrid seed from plantings of alternate strips of male sterile and pollinator plants are described. The strips are separated from each other by unplanted areas of several feet to ensure that branches of the two strains do not become entwined, thus causing mixing of the seed at harvesting. The results suggest that, in the northwestern States, a 4-row pollinating strip and 6-foot separating strip are satisfactory; the width of the strips of male sterile plants giving the best practical results has yet to be determined.

Owen, F. V. *The sugar beet breeder's problem of establishing*
 male-sterile populations for hybridization pur-
 poses. (pp. 191-94).

When crossed as pollen parents with male sterile plants (Sxxxz), hermaphrodite beets designated type O (Nxxxz) give progeny all of which are completely male sterile (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 858). Problems encountered in the identification of the desired type O plants are discussed. One procedure found useful for indexing hermaphrodite populations has been the incorporation of male sterility into an annual beet, whose flowering can be induced without the use of low temperature treatments. More information is required on the genetics of cytoplasmic male sterility; not all sources of male sterility possess the same cytoplasmic constitution and the genes concerned in the expression of male sterility may exert variable types of influence.

Savitsky, V. F. *A method of selection for earliness of root develop-*
 ment in sugar beets. (pp. 195-97).

The first stages of development are characterized by a rapid rate of growth of the leaves. The time when the roots begin to grow faster than the leaves is a satisfactory indication of the agricultural earliness of a variety. Selection for high yielding early beets in commercial plantings should be made at the time when differences in the root weight between varieties become clear, i.e. usually in July or August. Beets with good tops should be chosen first. From these, plants with root weight exceeding top weight should be selected. The selected plants should then be transplanted and the rate of root development checked during harvest.

Savitsky, H. *A method of determining self-fertility and self-*
 sterility in sugar beets, based upon the stage of ovule
 development shortly after flowering. (pp. 198-
 201).

Self sterility is due to absence of fertilization caused by the slow rate of pollen tube growth, and degeneration of embryos when selfing does occur. By examining the ovaries 10 to 12 days after the flowers open, and determining the percentages of (1) unfertilized ovules, appearing as small dark lumps, (2) normally developing seeds and (3) shrivelled seeds, the degree of self fertility can be estimated.

Brewbaker, H. E., *A quarter century of progress in sugar beet im-*
 Bush, H. L. and *provement by the Great Western Sugar Company.*
 Wood, R. R. *(pp. 202-07).*

Recently, much new material, including hybrids with *B. maritima*, has been selected. Varieties have been produced which are highly resistant to *Cercospora* leaf spot and show improvements in root yield and sugar content in comparison with the older varieties; these new varieties yield as much as 25% more sugar per acre than GW 18, for several years the standard in the area east of the Rocky Mountains.

Further improvement of the new leaf spot resistant varieties is planned, with regard to cold resistance, low respiratory activity, resistance to various storage rots, single or double germ fruits, and small and uniform crown. Selection of self-fertilized lines is also to be carried out in conjunction with the development of cytoplasmically male sterile lines, for the production of F_1 hybrid seed.

Coons, G. H., *The U.S. 15 variety of sugar beet.* (p. 208).
 Stewart, D.,
 Price, C. and
 Elcock, H. A.

Winter sowings in California have been made chiefly with US 15 in recent years. It has a nonbolting tendency, moderate resistance to curly top and a relatively high degree of resistance to downy mildew (*Peronospora Schachtii*) and rust (*Uromyces Betae*); it is very susceptible to *Cercospora* leaf spot. In districts subject to curly top, the greater curly top resistance of US 56, also a nonbolting variety, has given it advantage over US 15.

Coons, G. H. et al. *Report on 1949 tests of U.S. 216 x 225 and other*
 varieties from sugar beet leaf spot resistance
 breeding investigations of the U.S. Department
 of Agriculture. (pp. 209-17).

Tests were carried out on the following varieties in 16 localities: SP 471802-00, a synthetic variety composed of six unrelated inbreds; SP 471803-00, a synthetic derived from the inbreds A and U and the male sterile form of US 216; the control synthetic, SP 486-0, obtained by pooling seed of 9 European brands; SP 488-00, a synthetic seed stock composed of US 216 MS x 225 and a mixture of 5 inbred lines as pollinator; US 216 x 225; US 226, the result of intercrossing as F_1 generations 8 leaf spot resistant strains; H-125, a cross between a male sterile form of a Michigan inbred and US 216; and the appropriate local variety.

The results of tests of 12 varieties at two centres only gave additional information on US breeding stocks. The variety 48B3-00 is of particular interest on account of its resistance to black root and *Cercospora* leaf spot: immediate steps are being taken for its seed increase.

Price, C. and *A convenient method for preserving sugar beet pulp*
 Fife, J. M. *for analysis.* (pp. 218-20).

In improvement work agronomic tests are frequently made at considerable distances from the laboratory or sugar factory. A cold storage method for preserving sugar beet pulp from plants grown on experimental plots, until analysis in the laboratory is possible, is described.

Gaskill, J. O. *Possibilities for improving storage-rot resistance*
 of sugar beets through breeding. (pp. 664-69).

Significant differences between and within strains in resistance to storage rot (*Phoma Betae*) are reported, indicating that breeding for resistance should be advantageous.

2896. BREWBAKER, H. E.
Single-germ beet seed a commercial possibility.
 Through the Leaves, Colorado 1950 : 38 : No. 4 : 29-31.

Breeding work on the production of single germ sugar beet is described and illustrated (cf. Abst. 2895).

2897. BLENCOWE, J. W. and
TINSLEY, T. W.

The influence of density of plant population on the incidence of yellows in sugar-beet crops.

Ann. Appl. Biol. 1951 : 38 : 395-401.

The resistance of large topped Cannell's 937 and the small topped Marster's variety to yellows at the Norfolk Agricultural Station, England, increased with increasing population density, which was achieved by adjusting row width and singling distance. Although possible differences in genotype may influence reaction to infection, no significant varietal differences with respect to resistance have been observed in the field.

STIMULANTS

2898.

Annual Report of the Trelawney Tobacco Research Station for 1948.

Publ. Tob. Res. Bd. S. Rhod. 1949 : No. 12 : Pp. 111.

Data are presented from the yield trials of imported varieties. Selection has resulted in improvements in the varieties Bonanza, Gold Dollar, Willow Leaf, Jamaica Wrapper and Yellow Mammoth. Two promising strains of good leaf quality, C 7.46 and C 10.46, have been developed from crosses between Jamaica Wrapper and Bonanza. Further trials of imported varieties for resistance to eelworm are being carried out.

2899. KEHR, A. E.

Monoploidy in *Nicotiana*.

J. Hered. 1951 : 42 : 107-12.

The very few seeds resulting from the cross of *N. glutinosa*, used as female, and *N. repanda* were treated with 0.4% aqueous solution of colchicine for 24 hours at the time of germination. Four plants were obtained: an F_1 interspecific hybrid with intermediate flower characters; a diploid *N. repanda*; a monoploid *N. glutinosa*; and a monoploid *N. repanda*. The diploid *N. repanda* is believed to have arisen either by colchicine-induced doubling of the chromosomes of an androgenetic monoploid, or by the androgenetic development of an unreduced male gamete. The monoploid *N. repanda* could have originated only through androgenesis. The monoploid *N. glutinosa* must have been the result of either gynogenesis or haploid parthenogenesis. Meiosis in the two monoploids was extremely abnormal; the diploid *N. repanda* showed normal meiosis, except for some laggards at anaphases I and II in about 20% of the cells. The monoploids were sterile and lacked vigour. Another monoploid of *N. glutinosa* was found among F_1 plants from colchicine treated seed of *N. glutinosa* ♀ x *N. sylvestris* ♂.

2900. DESHMUKH, M. J. and
PAL, B. P.

A note on the tetraploid of *Nicotiana glauca*.

Indian J. Genet. Pl. Breed. 1950 : 10 : 72-77.

At the Indian Agricultural Research Institute, New Delhi, a tomato shoot was grafted on a stock of *N. glauca* and subsequently decapitated at the junction of stock and scion. The stock produced new branches of *N. glauca* including one tetraploid shoot ($n = 24$) from which seed was obtained. Diploid and tetraploid plants have been compared with respect to average height, thickness of stem, number and size of leaves per plant, stomatal size and number per unit area, flower size and fertility of pollen and seed.

2901. KEHR, A. E.

Genetic tumours in *Nicotiana*.

Amer. Nat. 1951 : 85 : 51-64.

Investigations have been carried out on 31 interspecific hybrid combinations which produce plants with tumours. The tumours were always spontaneously initiated from

within the plant and were produced in entire hybrid populations. Tumour formation was an inherited character and occurred only when the plants were not growing rapidly. *N. Langsdorffii* was involved in a higher number of the tumour forming combinations than any other species tested. In two combinations tumour production was associated with loss of chromosomes. Three hypotheses put forward by previous investigators to explain the phenomenon of tumour formation in interspecific hybrids of *Nicotiana* are rejected, viz. (1) immunological relationships, (2) heterogeneity of tissues and abnormal mitoses and (3) cytoplasmic disturbances. Evidence is presented leading to the view that the tumours are controlled by genes affecting the growth regulatory mechanism and appear when the phytohormone metabolism is disturbed in certain genotypic combinations (cf. Abst. 2043).

2902. ALCARAZ MIRA, E. and
CARIDAD IGELMO, J. M.
Trabajos genéticos para la obtención de razas de tabaco mejorando la combustibilidad. (**Genetical work to obtain tobacco varieties with improved combustibility**).
Genetica Iberica, Madrid 1950 : 2 : 217-31.

Hybrid 20 and Mammoth Gold are more combustible than the standard Spanish varieties Valencia and Maryland. Crosses involving these and other varieties showed that combustibility is a complex genetical character. Progenies, which, it is hoped, will combine required morphological characters with high combustibility, have now been carried forward into the F₄.

2903. MATUSIEWICZ, E.
Otrzymywanie nikotyny z machorki. (**Obtaining nicotine from *Nicotiana rustica***).
Tytoń, Warszawa 1950 : 6 : No. 9-10 : 6-7.

In two years' experiments with seven varieties of *N. rustica*, chosen beforehand for their high content of nicotine, the highest yield of nicotine was obtained from Pomorska Selection 4 and the highest average yield of nicotine for the two years from the hybrid Czerbl x Selvaggio 85/10.

2904. **New burley tobaccos immune to wildfire being developed.**
Crops and Soils 1951 : 3 : No. 7 : p. 30.

New strains of burley tobacco with a high degree of resistance to wildfire disease have been developed by the US Department of Agriculture from crosses involving *Nicotiana longiflora* (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1759). The plants are more vigorous and have a lower nicotine content than susceptible forms.

2905. TERNOVSKIĬ, M. F.
(**Immune varieties of tobacco**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 10 : 40-43. [Russian].

Tobacco breeding involving Mičurinite methods at the USSR Institute of Tobacco is described. Many varieties immune from mosaic and powdery mildew have been obtained. The range of the immune varieties extends over all types of oriental cigarette tobaccos grown in the USSR. New varieties include Dubec 7, Samsun 47/10, American 315 and Trebizond 161 and 300, which are remarkable for their high yield and quality of leaf. The two first named have been made standards.

Of the other immune varieties the following are named: Dubec, Dubec 565, Dubec 566, Samsun 47/2, American 314, Trebizond 292, Trebizond 295, Trebizond 288 and Krasnaja

Moskva [Red Moscow]. Some of these varieties have been previously referred to (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2510).

The breeding method consisted of repeated cross pollination of *Nicotiana glutinosa* with large amounts of pollen from *N. Tabacum* and trial and selection of the hybrid material for immunity from mosaic and mildew under conditions of infection.

Immunity proved dominant in crosses between immune and susceptible varieties, and experiments with vegetative hybrids suggest that immunity can be transmitted to the material by grafting. Mention is made of a vegetative hybrid combining the immunity from mosaic and mildew of Trebizond 161 scion with the resistance to black root rot of the stock variety Trebizond 295. Investigations of selective fertilization in tobaccos showed that varieties susceptible to mosaic and mildew crossed very readily with the immune varieties.

Extensive use of F_1 seed obtained from crosses involving the new immune tobacco varieties is advocated. Reference is made to a record tobacco yield of 48.8 c. per ha. collected at a state farm in Alma-Ata when hybrid seed from American 315 x Vengerskiï Ogorodnyi [Hungarian Garden] was used.

The following additions to the systematic nomenclature of tobaccos are put forward: *N. Tabacum* var. *immunis Erysiphæ*, *N. Tabacum* var. *immunis viri* and *N. Tabacum immunis viri-Erysiphæ*.

The present writer refers to disappointing results of his earlier experiments aimed at producing allopolyploids. Several of these have been obtained as a result of low temperature effects upon egg cells during cell divisions, but because of low yields and inferior quality of the leaves the polyploids proved useless.

2906. HEGGESTAD, H. E. and
CLAYTON, E. E.

Burley 1—a new black root rot resistant tobacco.

Circ. Tenn. Agric. Exp. Sta. 1951 : No. 106 : Pp. 3.

The chief advantages of Burley 1 are a high degree of resistance to black root rot and increased production of cigarette tobacco grades compared with Kentucky 16.

2907. STEINBERG, R. A.

Amino acid toxicities to tobacco varieties differing in resistance to black root-rot.

Bull. Torrey Bot. Cl. 1951 : 78 : 227-32.

Experiments on six tobacco varieties have revealed a positive correlation between toxicity of free aminoacids to the host cells and susceptibility to black root rot (*Thielaviopsis basicola*). It has therefore been concluded that the toxicity of the aminoacids diffusing from the hyphae of the fungus is a factor in overcoming the resistance of tobacco plants to infection.

2908. HOUGAS, R. W.

Factors affecting sap transmission of the potato yellow-dwarf virus

Phytopathology 1951 : 41 : 483-93.

Susceptibility of *Nicotiana rustica* to the sap-transmitted yellow dwarf virus depends on the age of the plant, age of the inoculated leaf, preinoculation light intensities and post-inoculation temperatures. Longevity of the virus is increased by the addition of cysteine hydrochloride to the inoculum. Although a high degree of resistance to artificial sap transmission has previously been experienced in the potato, efficient infection was accomplished at the Wisconsin Agricultural Experiment Station using a technique based on the above information.

2909. SUHOV, K. S. and VOVK, A. M.
(The relation between the heritable responses of *Nicotiana* species to tobacco mosaic virus and temperatures).
 Trudy Inst. Genetiki (Proc. Inst. Genetics) 1950 : No. 17 : 232-35.
 [Russian].

The heritable character of resistance to mosaic virus infection is associated with temperature. Under normal conditions the capacity for development of local necroses in infected tobacco plants is regarded as a dominant character and the incapacity of preventing infection from spreading as a recessive. In the present experiments a hybrid from *N. glutinosa* x *N. Tabacum* acquired the recessive character as a result of changed temperature conditions.

2910. HOLMES, F. O.
Indications of a New-World origin of tobacco-mosaic virus.
 Phytopathology 1951 : 41 : 341-49.

A study of the geographical distribution of resistant and susceptible forms of *Nicotiana*, *Capsicum* and *Lycopersicon* provides evidence to support the hypothesis that tobacco mosaic virus is of New World origin (cf. Abst. 2050).

2911. NALIVAÏKO, JU. and PROČAEV, V.
(High yields of hops in the year of planting).
 Kolhoznoe Proizvodstvo (Collective Farming) 1951 : No. 2 : p. 60.
 [Russian].

Reference is made to a productive clone 18, which has been developed at the Žitomir Scientific Research Station for Hops.

2912. GOLUBINSKIÏ, I. M.
(An instance of heterogeneity in hop tissues).
 Bot. Ž. (Bot. J.), Kiïv 1950 : 7 : No. 2 : 55-64. [Ukrainian].

Somatic mutations in the hop clone 18 are reported.

2913. SALMON, E. S.
"Bramling Cross", a new hop resistant to *Verticillium*-wilt.
 Wye College, Kent 1951 : Pp. 4.

Bramling Cross (OT 48) was developed from a cross between the English variety Bramling and the seedling male hop OL 45; the latter originated from a wild hop obtained from Canada. The new variety has late mid-season maturity, attractive aroma, preservative value equal to that of Bramling, satisfactory yielding capacity, good brewing quality and moderate resistance to *Verticillium* wilt. It has shown no undue susceptibility to downy and powdery mildew; it is a carrier of mosaic virus and should, therefore, not be planted near mosaic susceptible hops.

2914. **Tasmanian hops varieties prove suited to New South Wales conditions.**
 Agric. Gaz. N.S.W. 1951 : 62 : p. 192.

Promising bine growth is reported in different localities from trials of the varieties Kent Goldings, White Vine, Golden Cluster and 350L obtained from Tasmania.

2915. MONTESINOS V., J. M.
Un ensayo de aclimatación de ají. (**An experiment on acclimatizing red pepper**).
Agronomía, Lima 1950 : 15 : 43-49.

A breeding programme to produce suitable *Capsicum* varieties for Peru is outlined, special attention being paid to disease resistance.

2916. OGIHARA, T. and
OMURA, Y.
(**On linkage in the red pepper**).
Jap. J. Genet. 1946 : 21 : 27-28. [Japanese].

Hybridization experiments have shown that a linkage value of 20-24% subsists between the duplicate genes r_1 and r_2 for corolla colour and p for peduncle colour. Genes v for variegated leaf and μ for erect fruits are also linked, the linkage value being 15.4%.

2917. SMITH, P. G. and
HEISER, C. B. (JUN.).
Taxonomic and genetic studies on the cultivated peppers, *Capsicum annum* L. and *C. frutescens* L.
Amer. J. Bot. 1951 : 38 : 362-68.

C. annum and *C. frutescens* are considered to be valid species. Number of pedicels is especially valuable in distinguishing these two species. Two other species of cultivated peppers are recognized: *C. pubescens*, from Central and South America; and *C. pendulum*, grown along the west coast of South America. Of the varieties cultivated commercially in the USA, all except Tabasco are classified as *C. annum*. *C. frutescens* and *C. annum* have been found to be highly cross sterile; no viable seeds have been secured when the latter species formed the female parent; only a low percentage of viable seeds have been produced with *C. frutescens* as the female. Cytological study of the two F_1 hybrids obtained indicates complete chromosome homology between the two species. Only one of the hybrids has set fruit; this exhibited reduced percentage of good pollen, moderate self fertility and very low cross fertility with either parent. *C. annum* and *C. frutescens* differ markedly in their crossing behaviour with respect to *C. pendulum*.

2918. JACENKO, V. G.
(**Crambe, a new oil crop**).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 10 :
37-40. [Russian].

C. abyssinica showed promise as an oil crop in different parts of the USSR. The present breeding aims are resistance to drought, shedding, pests and diseases and a lower husk ratio than 25 to 30%.

2919. LIPPMANN, B.
Die Bienenrauke "Maja". (**The rocket salad "Maja"**).
Mitt. höh. Bundeslehr- u. VersAnst. Wein-, Obst- u. Gartenbau Wien-
Klosterneuburg, Bienenkunde Wien-Grinzing 1951 : 1 : 81-82.

The initial material *Eruca sativa* from which the new variety Maja was bred was collected in the 1935 Hindukush Expedition. The new variety is especially valuable for bee-keepers owing to its exceptionally prolonged flowering combined with its great attraction for bees; it is, moreover, not attacked by pests so that insecticides are unnecessary. After flowering it is green even when it has been made into silage. The hay is equivalent to the best meadow grass. The seeds of *E. sativa* yield about 33% of oil.

2920. RAJAN, S. S.,
HARDAS, M. W. and
PARTHASARATHY, N.
Breakdown of tetraploidy in colchicine-induced autotetraploid
***Eruca sativa* Lam.**
Indian J. Genet. Pl. Breed. 1950 : 10 : 43-55.

Following the discovery that colchicine-induced autotetraploids of *E. sativa* give rise to triploid and aneuploid forms under natural conditions in India, a cytological study was made at New Delhi using the parents and progeny of numerous crosses involving tetraploids and diploids. The breakdown of the cytological stability of autotetraploids, seriously limiting their use for breeding purposes, is attributed to the formation of functional gametes with variable chromosome numbers; unbalanced chromosome numbers were found to be due to unequal separation of multivalents, chromosome lagging and disturbances of the spindle mechanism. Natural crossing between chromosomally unbalanced gametes gives rise to triploids and aneuploids; some of the latter were found to be fertile. It is suggested that the establishment of aneuploids under natural conditions may result in new races.

2921. KLOEN, D.
Veredeling van koolzaad. (**Colza breeding**).
Jaarb. Algem. Bond Oud-leerl. Middelbaar Landbouwonderwijs, Wageningen 1950 : 113-21.

Under the following headings, the practical breeder in Holland is provided with a detailed account of how to breed for the improvement of colza: family selection; choice of initial material; technique of crossing; desired characters; plan of selection; maintenance of varieties; heterosis breeding; and vegetative multiplication.

2922. ARMSTRONG, J. M.
A tetraploid form of annual rape induced by colchicine.
Trans. Roy. Soc. Can. 1950 : 44 : Ser. III : Sect. V : 21-38.

Tetraploids ($2n = 40$) of German rape were induced at the Central Experimental Farm, Ottawa, by treating germinating seeds with 0.2% aqueous colchicine solution, under reduced pressure for half an hour, followed by soaking for six hours. Tetraploid plants, recognized by their increased pollen diameter, were selfed; tetraploids obtained from the C_0 plants were verified by chromosome counts and intercrossed. The F_1 tetraploid strains exceeded the diploid form in yield and weight of seed. They also showed significant interstrain differences in yield and seed weight, indicating scope for selection. In refractive index, iodine value and linolenic acid percentage of the oil, the tetraploids differed very slightly from the diploids. In percentage oil extracts, saponification number and percentages of free fatty acids and linolenic acids the differences between tetraploid and diploid material were more marked. The average of all tetraploid strains for oil percentage extracted was significantly lower than in the diploid form, but certain strains were sufficiently high in oil percentage extracted to warrant selection, possibly followed by further hybridization to obtain the best combinations of yield and oil content. The strains had a low variability for refractive index, saponification number and iodine number; variability in the other characters of the oil was fairly high, a fact of interest to the breeder. Meiotic studies revealed that the tetraploid strains suffered no impairment in fertility as a result of chromosomal irregularities.

2923. NARAIN, A.
Mutants in castor oil plant.
Sci. and Cult. 1951 : 16 : 484-85.

Three new mutants are described: (1) a type with red pigmentation throughout the plant; (2) a type with inflorescences bearing capsules showing different degrees of spininess; and (3) a type with a terminal male flower above the female flowers.

2924. ANDERSSON, G. and
OLSSON, G.
Försök med oljedådra—*Camelina sativa* Crantz. (**Experiments with
C. sativa Crantz**).
Sverig. Utsädesfören. Tidskr. 1950 : 60 : 440–58.

OLSSON, G.
Oljedådra—en ny oljeväxt. (***Camelina sativa*, a new oil plant**).
Lantmannen 1951 : 35 : 397–99.

C. sativa has for some time past been included among the oil plants undergoing selection by the Swedish Seed Association at Svalöf. The first of the above two papers deals with the systematic classification and the morphology of *Camelina* spp. and with yields, seed production and oil content of strain Sv 0700 and other selections from varieties from different localities. Trials have been carried out at stations of the association in different parts of Sweden and comparative yield figures for summer rape and white mustard are also given.

Results from 81 tests carried out by the Swedish Seed Association and by the Cooperative Association of Oil Plant Growers show that the *Camelina* material tested in Sweden is not inferior to other spring sown oil crops in seed yield or oil content.

The second paper deals more shortly with the new oil crop.

2925. MERRILL, S. and
BROWN, R. T.
Inheritance of height of head in tung trees.
Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 185–90.

Seedlings from selfed and open-pollinated seed of low headed and high headed clones and from crosses between low headed and high headed clones could be classified into a low headed type in which the first branch appeared between the 11th and 24th nodes, and a high headed type in which the first branch appeared between the 26th and 42nd nodes. The high headed character behaved as a simple Mendelian recessive, allelomorphic to the dominant low headed condition. Dominance of the latter character appeared to be incomplete.

2926. KLYKKEN, O.
Aleurites (Bankuloljetre og Tungoljetre). [***Aleurites* (the bankul and
tung tree)**].
Tidsskr. Norske Landbr. 1950 : No. 7–8 : 227–33.

Descriptions are given of *A. cordata*, *A. Fordii*, *A. moluccana* and *A. montana*, with observations on their geographical origin, seeds and oil.

2927. BOTTAZZI, G. B.
Pigmentatazioni antocianiche nel girasole (*Helianthus annuus* L.).
[**Anthocyanin pigments in the sunflower (*H. annuus* L.)**].
Genetica Agraria, Roma 1950 : 2 : 186–92.

From a statistical examination of the frequency of anthocyanin pigmentation in *H. annuus*, the writer found a correlation between anthocyanin pigmentation in the peduncles and in parts of the floral reproductive organs. A single gene for coloration, with modifying factors, is tentatively suggested on the basis of the author's statistical data and the genetic findings of other investigators.

The purplish-red colour that appears in the stems from a very early stage of growth can be used as a basis of selection for or against anthocyanin pigmentation, but it must be remembered that out of 100 plants with pigmented stems only 60 have pigmented seed coats.

2928. HEISER, C. B. (JUN.).

Hybridization in the annual sunflowers: *Helianthus annuus* x *H. argophyllus*.

Amer. Nat. 1951 : 85 : 65-72.

Natural hybrids between the above two closely related species have been found in Texas. The experimentally produced hybrids showed some fertility but were more fertile than previously studied hybrids between other annual sunflowers. Back-cross plants very closely resembled the recurrent parent in appearance but their pollen fertility was lower. In meiosis of the F_1 hybrids 13 to 15 bivalents and one or two chains of four chromosomes were observed. It is not yet known whether introgression has occurred between the two species. Under natural conditions adaptation to different soil types, the partial sterility of the hybrids and difference in time of flowering have prevented the amalgamation of the two species.

2929. BOTTAZZI, G. B.

La variabilità morfologica nel girasole (*Helianthus annuus* L.).

[**The morphological variability of the sunflower (*H. annuus* L.)**]

Genetica Agraria, Roma 1950 : 2 : 169-85.

The varieties of sunflower cultivated in Italy are very heterozygous. An analysis was therefore made of (1) the main morphological features of the plants, including achenes and seeds, and (2) physiological characteristics such as earliness and drought resistance. The ideal type to breed is briefly defined.

2930. ROSBACO, U. F. and

DE MIRÓ DE ROSBACO, A.

Relación entre el número de hojas y la precocidad en girasol. (**Relation between the number of leaves and earliness in the sunflower**).

Rev. Invest. Agríc., B. Aires 1949 : 3 : 303-04.

Number of leaves and number of days before the opening of the head were found to be positively correlated in the case of eight sunflower varieties grown in Argentina.

2931. LJAŠČENKO, I. S.

(**The development of *Orobanche* on different varieties and hybrids of sunflower**).

Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1948 : 63 : 749-51.

[Russian].

The growth of the parasite on several sunflower varieties and hybrids and the wild species *Helianthus ruderalis* was studied at the Rostov State University. *Orobanche* developed first on susceptible varieties, appearing 31 days after the emergence of the plants. Its growth on less susceptible varieties was delayed for several days. The parasite then developed more rapidly upon hosts with short growth periods than upon varieties with long growth periods.

The inheritance of lateness is normally dominant in the sunflower crosses, and resistance to *Orobanche* of the F_1 is normally associated with that of the late parent. In hybrid 800 x Saratovskii Karlik [Saratov Dwarf] earliness was dominant over lateness. As a result *Orobanche* developed more vigorously on this hybrid than on the late parent variety 800. Normally, *Orobanche* is 10-30 days ahead of its host in flowering, but its development is 7 to 14 days slower when it feeds upon roots of hybrids between susceptible and resistant varieties.

Hybrid 800 x Gigant [Giant] has a shorter growth period than the late parent Gigant with the result that the development of the parasite on the hybrid is more rapid than on Gigant. The hybrid from the reciprocal cross, on the other hand, has a long growth period and hence the development of *Orobanche* is slowed down.

It is concluded that *Orobanche* parasitizing hybrids derived from crosses involving a resistant variety as a female parent emerges later and completes its growth cycle earlier than it does on hybrids from the reciprocal crosses.

2932. . CARRIÈRE DE BELGARRIC, R.

Notes sur la sélection du palmier à huile à Sumatra. Résultats obtenus par la Société Financière des Caoutchoucs. (**Notes on oil palm selection in Sumatra. Results obtained by the Rubber Company**).
Oléagineux Rev. Gén. Corps Gras Dérivés 1951 : 6 : 65-71.

Oil palm selection in Sumatra from 1924 to the present day has resulted in an average increase of from about 2000 to 3800 kg. of oil per ha. for the first generation trees and to about 5000 kg. per ha. for the second generation. A table is given showing the yields obtained by controlled and by uncontrolled pollination from *dura*, *tenera* and *dura* x *tenera* hybrids. Some of the relative advantages of *dura* selections and selections of *tenera* and *dura* x *tenera* are mentioned.

The Dutch success in Sumatra might, it is thought, be taken as an example in oil palm selection in the French colonies in Africa.

2933.

Report of Wattle Research Institute, University of Natal for 1950 (third year) (1951) : Pp. 35.

A genetical analysis of the progeny of 17 *Acacia decurrens* inbreds is in progress. Differences in the degree of self fertility corresponded with those observed in the previous season.

Hybrids between *A. decurrens* and *A. mollissima* have been selfed. Three hybrid trees were pollinated by *A. mollissima* and one by *A. decurrens*; back crosses using the hybrids as males were also attempted. Other reciprocal crosses were effected between *A. dealbata* and *A. mollissima*. *A. Baileyana* was used to pollinate *A. mollissima*; the former proved to be female sterile. No seeds were set after pollinating *A. pycnantha* with *A. mollissima*. Segregation for certain characters was observed in a number of selfed and natural progeny from *A. mollissima*; data show that it was possible to calculate the minimum percentage of natural crossing in certain trees.

Numerous seeds of *A. mollissima* were treated with different concentrations of colchicine before planting.

Chromosome numbers of several twin seedlings have been determined; all had the normal diploid complement.

Significant differences were observed in a number of *A. mollissima* seedlings in respect of seed weight, seed volume and fertility.

Ten fixatives were tested to determine the most suitable for use when staining root tip chromosomes; Medium Flemming, Strong Flemming, 2BD and a modified form of 2BE with increased chromic acid content have proved satisfactory. Squash methods were not successful.

2934. TAKENAKA, Y.

Notes on cytological observations in *Colchicum*, with reference to autotoxycosis and sterility.

Cytologia, Tokyo 1950 : 16 : 95-99.

Chromosomal aberrations observed during meiosis in *C. autumnale* resemble those of other plants treated with colchicine. It seems probable that colchicine contained in *Colchicum* itself is responsible for the abnormalities and subsequent sterility.

2935. KHATTAK, G. M.

***Ephedra* in Baluchistan.**

Pakistan J. For. 1951 : 1 : 37-40.

The need for a cytological investigation of the species and varieties of *Ephedra* growing in Baluchistan is stressed, particularly as the commercially exploitable ephedrine content varies in the different forms. Seasonal fluctuations of ephedrine have also been found in certain species.

2936. URIBE HENAO, A.

Aspectos técnicos en la producción de caucho *Hevea*. (**Technical aspects of the production of *Hevea* rubber**).

Rev. Fac. Nac. Agron., Colombia 1950 : 11 : 151-244.

This essay on rubber starts with a brief account of rubber-producing plants in general, including *Castilla*, *Parthenium*, *Manihot*, *Sapium*, *Funtumia*, *Cryptostegia* and *Taraxacum*, followed by a somewhat detailed description of the genus *Hevea*. The many difficulties in collecting living seed specimens are held to account for the confusion which still reigns partially in the taxonomy of the genus; the most recent views would seem to confine the number of species to eight, of which seven are encountered in Colombia; a further clarification of the taxonomy is thought to be essential as a basis for advances in *Hevea* breeding. No reliable data are yet available on the comparative merits of the different species and botanical varieties in respect of yield or quality.

A description is given of the methods of exploiting wild rubber employed to-day in the Amazonian region of Colombia, and of the history of rubber cultivation, first in the orient and later in the South American continent. This was only possible after the introduction of clones resistant to *Dothidella Ulei*. Such clones are now being supplied by Brazil as part of the cooperative programme of research between South American countries for the improvement of rubber cultivation, sponsored by the Rubber Experiment Station at Turrialba. Some of the special difficulties associated with selection work in *Hevea* are mentioned; it is pointed out that in the Amazon region of Colombia the wild trees having a dark red bark are considered better latex producers than those with lighter coloured bark and it seems probable that these trees belong to a distinct botanical variety. Studies of the wild rubber trees of the Colombian Amazon region indicate that several of these distinct "forms" or types exist and that some of them may have potentialities much superior to those of the rubber trees selected in the orient from what now proves to be very inferior parental material originating from Brazil. Some of the wild Colombian trees are resistant to *D. Ulei* and further experiments with them are now in progress.

Indications are given of the oriental clones so far found most promising for planting in tropical America, and for use as parents in a hybridization programme aiming at producing valuable clones resistant to *D. Ulei*. The most efficient methods of cultivation and preparation of *Hevea* rubber are briefly outlined, and a final section is devoted to synthetic rubbers.

2937.

Report of the Rubber Research Institute of Malaya for the period September 1945 to December 1948 (1950) : Pp. 295.

Numerous hand pollinations were carried out in 1948. Data are presented concerning the number of seeds harvested from each cross and their percentage germination; many promising clones were used as parents for the first time. Tapping yields from crosses made between 1937 and 1939 are recorded. High yielding progeny have been obtained from Tj 1, Av 157, B 84, TK 14, BR 1 and BR 2; PB 49 continues to produce outstanding progeny (cf. Abst. 1280). Yield trials of many selections are in progress; the clones RRI 500-529 are also being tested.

Although brown bast has been common for several years there are no records of the inheritance of a high degree of susceptibility.

2938. PICHEL, R. J.

Premiers résultats en matière de sélection précoce chez l'Hévéa.

(**Preliminary results regarding early selection in *Hevea***).

Publ. Inst. Nat. Agron. Congo Belge 1951 : Sér. Tech. No. 39 : Pp. 43.

The effectiveness is discussed of selection based on (a) the vigour of seedlings in the nursery and (b) early yielding capacity as determined by the Testatex knife (cf. *Plant Breeding Abstracts*, Vol. XI, Abst. 195). Both investigations were carried out at Yangambi. The

significance of the results for rubber selection and the establishment of commercial plantations is emphasized.

2939. CARPENTER, J. B.
Target leaf spot of the *Hevea* rubber tree in relation to host development, infection, defoliation, and control.
Tech. Bull. U.S. Dep. Agric. 1951 : No. 1028 : Pp. 34.

An extensive survey of clones, selections and seedling populations has shown that heritable resistance to target spot (*Pellicularia filamentosa*) is uncommon, although some degree of tolerance exists. Clones of *Hevea brasiliensis* usually show a high degree of susceptibility; but two top-worked clones were tolerant in field plantings. *H. Benthamiana*, *H. pauciflora* and *H. rigidifolia* might be useful sources of genetic resistance.

2940. LE CONTE, J.
Sur le développement de plantes à caoutchouc en France. Premières observations. (**On the development of rubber plants in France. First observations**).
Rev. Gén. Caoutch. 1943 : 20 : 192-94.

The material of *Taraxacum Kok-saghyz* received in France proved highly variable. Notes are presented on the variation in leaf form and root morphology.

2941. CATCHESIDE, D. G.
The B-chromosomes of *Parthenium argentatum*.
Genetica Iberica, Madrid 1950 : 2 : 139-48.

The meiotic behaviour of the heterochromatic B chromosomes in *P. argentatum* has been investigated (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1796). Much of their pairing association lapses by metaphase I and at this stage they usually occur as univalents. At anaphase I the B chromosomes lag slightly behind the normal A chromosomes and the univalents tend to pass together to one pole rather than to separate at random. It is suggested that this unusual nonrandom segregation is explicable by the hypothesis that many of the diakinesis associations are false and the resulting univalents thus have correlated orientation and movement on the spindle.

FRUITS AND NUTS

2942. BROOKS, R. M. and
OLMO, H. P.
Register of new fruit and nut varieties. List No. 5.
Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 509-37.

Information is given on the origin and chief characteristics of varieties of many kinds of fruits and nuts in the United States.

2943.
Annual Report of the East Malling Research Station, near Maidstone, Kent, 1st October, 1949 to 30th September, 1950 (1951) :
Pp. 219.

Rogers, W. S. I. *Pomology*. (pp. 21-27).

Tree fruits

Selection of apple seedlings from crosses made to improve dessert quality has continued. Breeding for resistance to woolly aphid has been resumed. King of the Pippins, Ellison's Orange, James Grieve and Worcester Pearmain were used to pollinate Cox's Orange Pippin

in an investigation of the effects of pollen on fruit development; a chemical analysis of the mature fruits was undertaken.

Differential responses of Laxton's Superb, Miller's Seedling and Bramley's Seedling to sprays causing defoliation and blossom thinning have been recorded. Studies concerning frost resistance have been continued on five apple varieties at several growth stages. Amongst apples cropping for the first time, differences in dates of flowering and fruit maturity were noted. The spurs of ten new seedlings are being studied to determine the frequency of cropping that can be expected.

Apple, pear, apricot, plum, cherry and peach rootstock trials have been maintained.

Small fruits

Further selections from raspberry families (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2148) were planted out. Frost damage records show that Malling Enterprise was most resistant and Malling Landmark most susceptible. An unexplained leaf scorch reduced the yields of some raspberry varieties, particularly Malling Exploit and Malling Z.

Hybridization between the black currant and other related species has been continued; the use of colchicine to produce fertile polyploids is being investigated. Of nine black currant varieties subjected to low temperatures, Seabrook's showed least damage.

Spineless gooseberries from Canada are being used to breed spineless varieties suited to local conditions.

Plants of a variant form of the Royal Sovereign strawberry, with adpressed petiole hairs, appear to resemble the normal type in other respects (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1155).

Hoblyn, T. N. and II. *Statistics and records.* (pp. 28-29).
Pearce, S. C.

Studies of methods of experimental design have been continued.

Harris, R. V. V. *Plant pathology.* (pp. 38-41).

Hop breeding for resistance to *Verticillium* wilt has continued. Wilt resistant males were crossed with Fuggle 1147 and OT 48 in an attempt to produce resistant hops with commercially desirable characters. Many new seedlings from resistant parents have shown a high degree of resistance in primary trials.

At least two strains of the apple mosaic virus have been isolated. Experiments are under way to determine the reactions of our commercial varieties.

Cherry varieties differing in degree of susceptibility to *Pseudomonas mors-prunorum* have been used to investigate the importance of the leaf spot and leaf scar as sources of inoculum causing winter canker. During the leaf spot phase, considerably fewer bacteria were found on the leaves of resistant varieties than on susceptible ones.

Harris, R. V. and A.R.C. *Scottish raspberry investigation.*
Cadman, C. H. (pp. 50-51).

The high degree of resistance to the vein banding virus exhibited by *Rubus Idaeus* has not been inherited by hybrids derived from crosses with the susceptible *R. occidentalis*.

At Slatefield and Kirriemuir, Malling Landmark outyielded other varieties. In respect of fruit quality, growth habit, suitability for canning and yielding capacity, Malling Jewel (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2148) has been outstanding.

Glenn, E. M. *Walnut varieties.* (pp. 80-86).

Descriptions are given of varieties grown for their nuts, with particular emphasis on differences in quality and appearance of the nuts, and in time of leafing, which affects reaction to frost damage. Eight selected English varieties are included.

Taylor, J. *The estimation of fruit size of cherries by sampling methods.* (pp. 93-99).

The results of size sampling experiments, carried out in 1949 and 1950 with four varieties, are discussed.

Taylor, J. *Statistical studies on strawberry crop and vigour measurements.* (pp. 100-07).

Data are presented concerning the following: arrangement of plots and blocks in cropping trials; values of crop weight, blossom weight and vigour measurements in analysis of covariance to reduce variability in the subsequent crop; and the interpretation of the spread of a plant in relation to its health.

Cadman, C. H. and *Raspberry virus disease: a survey of recent work.*
Harris, R. V. (pp. 127-30).

The scope of disease analysis by graft transmission has been increased by the use of a larger number of varieties of *Rubus Idaeus* and additional species as standard indicators.

Preston, A. P., *The influence of rootstock on spray damage in*
Moore, M. H. and *apple.* (pp. 132-36).
Bennett, M.

Differences in the reaction of eight-year old trees of Cox's Orange Pippin to lime-sulphur spraying were correlated with the relative vigour of the rootstocks; increases in damage occurred with increased vigour.

Blair, C. A. *Damage to apple leaves by the fruit tree red spider mite, Metatetranychus ulmi (Koch).* (pp. 152-54).

Methods of estimating the extent of damage are described. Varietal differences in reaction to mite attack appear to be dependent on the number of layers of palisade mesophyll in the leaves.

Beard, F. H. *The classification of hop varieties according to their ease of picking.* (pp. 187-89).

Data are presented concerning the relative ease with which 26 varieties can be gathered. The habit of growth is the controlling factor, modified by the cone size and firmness of cone attachment.

Beard, F. H. *Propagation trials with hops. VII. Number and size of sets produced from strap-cuts of certain varieties.* (pp. 190-92).

Differences in the number and size of good sets produced by mosaic tolerant and mosaic resistant varieties have been associated with the incidence of downy mildew (*Peronospora Humuli*).

Hoblyn, T. N. *Research on fruit tree rootstocks.* (pp. 193-200).

The production of apple, pear, plum and cherry rootstocks during the past 38 years is reviewed, with indications of future research.

Cadman, C. H. and *Raspberries in Scotland.* (pp. 203-08).
Wood, C. A.

A popular account is given of raspberry cultivation in Scotland, with descriptions of ten varieties of commercial importance.

2944. RAJAGOPALAN, N. S.
 Annual Report of the Fruit Research Station, Kodur, Cuddapah District, for the year 1947-48 : Pp. 16.

Varietal and rootstock trials of citrus and mango are reported from the Kodur Station, Madras. Hybrid progenies of mango are under observation. Clonal progenies of maggot resistant trees of *Zizyphus Jujuba* are being raised. The grape variety Luk-fata continued to show resistance to downy mildew; the grapes White and Red Muscatel maintained their resistance to powdery mildew.

2945.

Progress Report of the Dominion Experimental Station Summer-land, British Columbia 1937-1948.

Dep. Agric., Canada 1951 : Pp. 101.

In addition to a report of fruit breeding work, summarized below, a survey of fruit and vegetable trials is given. Fruit varieties bred at the Station are described in detail.

Apple

In breeding for high quality and suitability for long storage, Golden Delicious, McIntosh, Newtown and Winesap have shown promise as parents.

Jubilee (McIntosh x Grimes Golden) and Spartan (McIntosh x Newtown) were introduced in 1939 and 1936 respectively.

Pear

Hybrid seedlings are under observation.

Apricot

Breeding work has resulted in Reliable [Wenatchee Moorpark x L-129 (Heweston)], introduced in 1945.

Plum

Open-pollinated seedlings, particularly of Italian Prune, have been selected. No seedlings have been obtained from controlled crosses.

Cherry

Many crosses have been effected. Van (open-pollinated seedling of Empress Eugène) and Star (open-pollinated seedling of Deacon) have been developed (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1870).

Peach

Elberta, J. H. Hale, Rochester, Vedette and Veteran were the chief parents used in hybridization. Spotlight (Veteran x Rochester) was introduced in 1946.

2946. ALDERMAN, W. H.

New Minnesota fruits for 1951.

Amer. Nurserym. 1951 : 93 : No. 8 : 13-14, 29-31.

The new cherry Northstar and new apple Lakeland, developed at the Minnesota Agricultural Experiment Station, are being introduced. The chief advantage of Northstar is its hardiness. Lakeland is a hardy annual bearer, producing good yields of red fruits with good quality. Four apples previously introduced are also discussed: Redwell (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 483), Oriole (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2795), Beacon and Minjon. Beacon is likely to be of commercial value on account of its fine red colour; it ripens at about the same time as Duchess or a little later. Minjon is very similar to Jonathan, and ripens later than Beacon, Lakeland and Wealthy. Mention is made of some promising fruits not yet introduced: the cherry Minnesota 66, maturing ten days later than Northstar, a type similar to Early Richmond or Montmorency; the currant Minn. 69, producing larger berries than Red Lake; the hardy, early red raspberry Minn. 321; and the sweet, large fruited gooseberry Minn. 206.

2947.

Proceedings of the Forty-Sixth Annual Meeting of the Washington State Horticultural Association December 4, 5, 6, and 7, 1950 : Pp. 310.

Lowe, L. E.

The Standard Delicious variety and its future.
(pp. 5-6).

The preference of the consumer is discussed with respect to apple varieties grown commercially in Washington; the variety Standard Delicious, which has a declining market value, is considered in particular.

Hayes, W.

The Standard Delicious variety and its future.
(pp. 15-16).

Compared with Red Delicious, Standard Delicious is of equal quality apart from colour. Attempts are being made by growers to produce Standard Delicious apples of superior colour, more desirable for marketing.

Fogle, H. W.

Winter hardiness of apricot variety crosses.
(pp. 19-23).

Breeding and selection are being carried out to develop apricots with high processing quality, extended maturity season, winter and frost hardiness and disease resistance for the Pacific Northwest. The commercially acceptable varieties Tilton and Wenatchee Moorpark are insufficiently hardy for Washington conditions. Various crosses have shown that Riland and Perfection transmit a high degree of winter hardiness to their progeny; Riland is highly homozygous for this dominant factor.

Taylor, N.

Accomplishments and objectives of the Columbia view experimental plots. (pp. 81-84).

At the newly established experimental station, near Wenatchee, Wash., varietal trials of peach are being carried out for adaptability to northern Washington. Investigations are also being made on the susceptibility of apricot, cherry and peach varieties to virus diseases prevalent in the area.

Brooks, R. M.

Sweet cherry production problems in California.
(pp. 136-46).

In a discussion of varieties of cherry grown commercially in different localities in California, mention is made of the following promising selections now under trial by growers: California 56 (Bing x Bush Tartarian), California 46 (Lambert x Bush Tartarian), California 23A-3a (Oregon A-10 x Bush Tartarian) and California 30-9a (La Cima x Chapman).

Merrill, G.

Better peaches. (pp. 147-51).

The necessity of breeding peaches which are attractive to the consumer is emphasized. Information is given concerning new mid-season varieties of superior quality and appearance which are still under trial in California.

Roberts, A. N. and
Hansen, E.

Effects of 2,4,5-T sprays on color development and ripening of apples, peaches and pears.
(pp. 191-93).

Varietal differences were observed, at the Agricultural Experiment Station, Ore., in the degree of acceleration of the rate of ripening in apples, pears and peaches after spraying with dilute concentrations of 2,4,5-trichloro-phenoxyacetic acid a few weeks before the normal date for harvesting. Foliage injury was more severe in certain varieties than others.

Luce, W. A.,
Fogle, H. A.,
Tuttle, L. H. and
Bullock, R.

New fruits. (p. 249).

A brief summary is given of the performance of new varieties of fruit described in the previous report (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1870).

2948. THOMPSON, A. H. and
BATJER, L. P.

The effect of boron in the germinating medium on pollen germination and pollen tube growth for several deciduous tree fruits.
Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 227-30.

Pollen of pear and other fruit species grown in Central Washington attains a higher percentage of germination and much greater length of tube when boron is included in the

germinating medium than when boron is absent. The effect of boron sprays upon fruit set is under investigation. No relationship has been detected between pollen response to boron in the germinating medium and the fertility characteristics of different varieties.

2949. HODGSON, R. W.,
SCHROEDER, C. A. and
WRIGHT, A. H.
**Comparative resistance to low winter temperatures of subtropical
and tropical fruit plants.**
Proc. Amer. Soc. Hort. Sci. 1950 : **56** : 49-64.

The material upon which observations on frost resistance were made at Los Angeles, Calif., included varieties, races, species or hybrids of citrus, cherimoya, white sapote, *Psidium Cattleianum*, guava, banana, *Carissa grandiflora*, avocado, *Annona tenuifolia* and *Macadamia tenuifolia*.

2950. FACCINI, G. C.
La stazione di Wädenswil. (**The Wädenswil station**).
Ital. Agric. 1951 : **88** : 215-22.

A general description is given, for the benefit of Italian readers, of the activities of this well known Swiss research station. One of the most important branches is the production of new varieties of fruit trees and vines, and of their rootstocks.

2951. KOOPMANS, W.
Nieuwe appels. (**New apples**).
Fruitterteelt 1951 : **41** : 206-07.

Nineteen new varieties of apple that will be officially approved in 1950-51 are described, with notes on their origin. Many have been obtained by hybridization. The list includes: Glorie van't Goy, Hugo de Vries, Ysselpronk, Kameleon [Chameleon], Prins Bernhard, Prinses Beatrix, Prinses Irene, Rembrandt, Rubens and Lucullus.

2952. LAMB, J. G. D.
The apple in Ireland; its history and varieties.
Econ. Proc. R. Dublin Soc. 1951 : **4** : 1-63.

After tracing the history of apple cultivation in Ireland, the value of some varieties of Irish origin, no longer propagated commercially, is discussed in respect of disease resistance, skin colour and fruit quality. Over 70 varieties are described in detail.

2953. SAX, K.
**The effect of the rootstock on the growth of seedling trees and
shrubs.**
Proc. Amer. Soc. Hort. Sci. 1950 : **56** : 166-68.

The results of experiments on apple and lilac indicate that seedlings showing poor growth on their roots may make good growth when grafted on suitable rootstocks. This technique may be valuable in growing segregates of interspecific hybrids and cytologically abnormal individuals which lack vigour when raised on their own roots.

2954. ZANON, K. W.
Befruchtungsbiologische Untersuchungen an Südtiroler Apfelsorten.
(**Pollination investigations with South Tyrolean apple varieties**).
Züchter 1950 : **20** : 267-75.

Self and cross compatibility relationships were studied with 14 South Tyrolean apple varieties. Pollen germination, except in three triploid varieties, was good. All varieties

were highly self sterile but compatible with most other varieties. The combination Kanada Renette x Köstlicher was incompatible.

2955. ROSSI, F.
La mela Conventina. (**The Conventina apple**).
Ital. Agric. 1951 : 88 : 229-36.

The agricultural faculty of the University of Perugia has made a study of the varieties of apple grown in the Italian province of Umbria. The most suitable varieties are those which flower late and so escape spring frosts, and the variety Conventina, from Gubbio, combines this characteristic with highly aromatic fruit of excellent quality and keeping capacity. A full description of the variety is given.

2956. LISAVENKO, M. A.
(**I. V. Mičurin and gardening in the north**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 3 : 6-13.
[Russian].

New varieties of hardy apples, one currant and one strawberry, developed in Siberia, are mentioned. The apples include varieties obtained from crosses between Ranetka Purpurovaja [Purple Reinette] and large fruited Mičurin varieties and a vegetative hybrid involving Pepin Šafrannyi [Saffron Pippin] and Slavjanka [Slav] as components in the graft. In this connexion, Ranetka Purpurovaja is described as promising material in Mičurinite breeding under Siberian conditions.

The new currant variety, Primorskii Čempion [Primorje Champion], was obtained in the Soviet Far East from a cross between a West European variety Lija Plodorodnaja [Fertile Lia] and a wild currant from the Jakutsk province.

The new large fruited strawberry, Štanina [Štanin's], developed at Omsk, is compared with Roščinskaja in respect of its yield and other economic characters.

2957. ERMOLAEV, P. S.
(**The orchard of the collective farm "Ob'edinennyi Trud"**).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 3 : 19-21.
[Russian].

New apple varieties, Ranetka Ermolaeva [Ermolaev's Reinette], Aport Sibirskii [Siberian Aporte], Sibirjak [Siberian], Avrik, 23, Kaljvilj Sibirskii [Siberian Calville] and Pepin Sibirskii [Siberian Pippin], which are hardy under Siberian conditions and have larger fruits than Ranetka Purpurnaja [Purple Reinette], were derived from crosses involving the last named variety as a female parent. The male varieties included Pepin Šafrannyi [Saffron Pippin], Renet Simirenko [Simirenko's Reinette], Aport, and Kaljvilj Anisovyi [Anis Calville]. The varieties have been multiplied and are under trial.

2958.
Five thousand apple seeds from America.
Agric. Gaz. N.S.W. 1951 : 62 : p. 195.

Seeds produced in Illinois from various crosses between hybrids resistant to black spot (*Venturia inaequalis*) and susceptible commercial varieties are being grown in New South Wales; they will be included in trials with locally developed hybrids possessing resistance to black spot.

2959. POTTER, J. M. S. and
TAYLOR, H. V.
Report of the National Fruit Trials, 1921-1950.
J.R. Hort. Soc. 1951 : 76 : 240-52.

The performances of seedling varieties of apple, pear and plum on trial at Wisley, England, over a period of 30 years are reviewed.

2960. REIMER, F. C.
A genetic bud mutation in the pear.
 J. Hered. 1951 : 42 : 93-94.

A bud mutant of Bartlett, named Max-Red Bartlett, produces reddish shoots and leaves and dark red fruit. Data from crosses involving this sport show that Max-Red Bartlett transmits the reddish colour of the leaves and bark to a high percentage of the seedlings, when used either as female or male parent. The hybrid seedlings are at present only one year old. Another bud mutant, found on a tree of Beurré Hardy and designated Royal Red Hardy, is described. This mutant produces dull red fruits and young shoots with reddish bark and leaves, in contrast to the greenish yellow fruit and green leaves and bark of the parent variety. Open-pollinated seedlings of Beurré Hardy all possess green leaves and stems; 42% of the open-pollinated seedlings of the mutant have reddish bark and leaves.

2961. SCARAMUZZI, F.
 Ricerche sulla biologia florale e di fruttificazione del cotogno. (**Research on the floral biology and the set of fruit of the quince**).
 Ann. Sper. Agrar., Roma 1951 : 5 : 543-57.

Studies in 1949 and 1950 showed that not all cultivated varieties of quince are self-fertile. Out of six artificially selfed varieties, Champion, Portogallo and Mostruoso di Bazine [Bazine Monster] set fruit, but Mostruoso di Vrania [Vrania Monster], Smirne and Gigante di Leskovatz [Leskovatz Giant] gave no set. The first three varieties, however, gave a better set when cross-pollinated.

The percentage of viable pollen in the quince was very high. Parthenocarpy was not observed.

2962. RADŽABLI, A. D.
(The medlar varieties of Azerbaïdžan).
 Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 1 : 30-32.
 [Russian].

The best Azerbaïdžan varieties of medlar, Képék Kitil, Gobak, Gébélé, Ag [White], Kara [Black] and Kaisy are described. The fruits of Kitil and Gobak are larger than those of the other varieties. They reach maturity in November.

2963. ŠEFTELJ, I. M.
(For the further progress of mass research).
 Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 2 : p. 50.
 [Russian].

Breeding apricots and peaches for hardiness has been begun at the Nikita Botanical Garden. The aim is to obtain varieties for cultivation in the Crimean steppe zone. Material suitable for raising from stones by the cluster method was selected at the institute and dispatched to collective farmers in the zone.

2964. CRUESS, W. V. and
 RIVERA, W.
Fresh juice of Italian variety prunes.
 Canner 1951 : 112 : No. 13 : p. 11.

Juice from Italian, also known as the variety Oregon or Fellenberg, is considered to be superior in colour, flavour and degree of acidity to juice from the prunes French, Imperial and Sugar.

2965. HAVIS, L.,
HALLER, M. H.,
DUNEGAN, J. C.,
COCHRAN, L. C. and
PORTER, B. A.
Peach growing east of the Rocky Mountains.
Fmrs' Bull. U.S. Dep. Agric. 1951 : No. 2021 : Pp. 54.

Information on a large number of peach varieties is included.

2966. ACKERMAN, W. and
HOUGH, L. F.
Determination and correlation of leaf and fruit pigments of yellow- and white-fleshed peaches.
Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 157-63.

Chromatographic adsorption and spectrophotometric analyses of leaf pigments of peach varieties and seedlings were evaluated for correlations with flesh colour of the fruit, to provide a method suitable for breeding work. In the analyses of spectrophotometric reflectance curves, leaf samples from 562 trees were separated readily and accurately for white and yellow flesh colour on the basis of the percentage reflectance at the single wavelength of 510 m μ .

2967. WEINBERGER, J. H.
Chilling requirements of peach varieties.
Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 122-28.

Information is provided on the chilling requirements of a large number of peach varieties, as shown by their performance at Fort Valley.

2968. HESSE, C. O. and
GRIGGS, W. H.
The effect of gland type on the wettability and water retention of peach leaves.
Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 173-80.

Surface tension is probably responsible for the difference in the wetting of glandular and eglandular foliage of the peach. Wettability of the foliage surfaces and the length of time water is retained under drying conditions may affect the development of pathogenic organisms and the habitat of small insects. But whether or not the degrees of wettability of leaves of varieties with different types of gland are directly related to differences in susceptibility to diseases and pests was not determined. Other factors, however, appear to influence susceptibility besides wettability. Thus the peach Libbee, a globose glanded variety, is as susceptible to mildew as many of the eglandular varieties; surface tension measurements for the leaves of Libbee indicated that this peach falls within the same range as the other varieties with globose glands.

2969. CHITWOOD, G. B.,
SPECHT, A. W. and
HAVIS, A. L.
Reactions of peach seedlings to nematode infections.
Phytopathology 1951 : 41 : p. 559 (Abst.).

Differences in the reaction to *Meloidogyne javanica* and *M. incognita* are recorded among the rootstock varieties Yunnan, S-37, Red Shadow and Lovell.

2970. SINGH, R. N.
Probable bud sports in *Citrus*.
 Curr. Sci. 1951 : 20 : p. 105.

Two bud sports, one of the variety Turanj (*C. medica*) and the other of the variety Malta (*C. sinensis*), have been found at the Fruit Research Station, Saharanpur, United Provinces, which show improvements in comparison with the normal types.

2971. TAŠMATOV, L. T.
(An attempt to grow rootstocks for citrus in Uzbekistan).
 Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 2 : 47-49.
 [Russian].

Rooted cuttings of one year old lemon and orange seedlings produced rootstocks that were most adapted to Uzbekistan conditions.

2972. RYNDIN, N. G.
(Overwintering of citrus fruits in the Crimea under a screen of park trees).
 Agrobiologija (Agrobiology) 1950 : No. 6 : 138-41. [Russian].

Experiments at the Nikita Botanical Garden with lemons, oranges and the hardy grapefruit hybrids known as natsumikan suggest that training citrus for hardiness will be facilitated by screening seedlings with cork oaks.

2973.
 "Podredumbre de la raicilla" o "tristeza" de los citrus. Conclusiones arribadas por la Comisión de Técnicos Citrícolas. **(Root rot or tristeza of citrus fruits. Conclusions arrived at by the Commission of *Citrus* Experts).**
 Circ. Estac. Exp., Tucumán 1949 : No. 143 : Pp. 6.

Stocks recommended for their resistance to tristeza [sadness] include *Poncirus trifoliata*, the Rangpur, Cleopatra and Oneco mandarins, and the rough lemon.

2974. SINGH, T. C. N. and
 SHAH, R.
The chromosome counts of *Citrus suntara*.
 Curr. Sci. 1950 : 19 : p. 385.

A chromosome number of $n = 9$ is reported for *C. suntara*.

2975. NISHIYAMA, I.,
 YAMADA, I. and
 KONDO, N.
(Cytological studies on the bread fruit).
 Jap. J. Genet. 1944 : 20 : 76-77. [Japanese].

Meiosis in fertile varieties of *Artocarpus communis* ($n = 27$) is regular. In sterile varieties, however, though 27 bivalents are formed, meiosis becomes disorganized after pachytene and viable gametes are seldom produced.

2976. ALVAREZ GARCÍA, L. A.
Anthrachnose of the Annonaceae in Puerto Rico.
 J. Agric. Univ. P.R. 1949 (1950) : 33 : 27-43.

Similar anthrachnose lesions are produced on different species of *Anona* in Puerto Rico by all polymorphic strains of *Colletotrichum gloeosporioides*.

2977. . VERMA, G. S. and
KAMAL, M.

Rot of *Mangifera indica* Linn. caused by *Aspergillus*.
Curr. Sci. 1950 : 20 : 68-69.

Mango fruit rot, caused by *Aspergillus niger*, has been observed in orchards in the Lucknow area of India. The varieties Gola and Safeda are particularly susceptible.

2978. ALMEIDA, J. L. F. DE.

Sobre a cariólogia de *Ceratonia Siliqua* L. (**On the caryology of *C. Siliqua* L.**).

Agron. Lusitana 1948 : 10 : 263-77.

The chromosome complement of *C. Siliqua* is described; there are $2n = 24$ chromosomes. In view of the prevalence of 12-chromosome species in other members of the family and the occasional occurrence of secondary associations, *C. Siliqua* is regarded as an autotetraploid.

2979. ŠČEPOTJEV, F. L.

(**Metaxenias in *Juglans nigra***).

Priroda (Nature) 1950 : No. 11 : 59-61. [Russian].

In experiments conducted in the Kirovograd province, Ukraine, the physiological effects of pollen upon maternal tissue was studied in the hybrid fruits obtained from direct and reciprocal crosses between *J. regia*, *J. nigra* and *J. mandshurica*. It was found that the pollen of *J. regia* and *J. mandshurica* caused changes in the shape of endocarps of the fruits of *J. nigra*, but that no changes in the shape of endocarps occurred when *J. regia* or *J. mandshurica* were pollinated with *J. nigra* pollen. The changes in the endocarps due to the pollen of *J. regia* were more frequent than those due to *J. mandshurica*, despite the fact that the latter variety gave a higher percentage of successful crosses.

2980. ŠČEPOTJEV, F. L.

(**Twin fruits of the walnut**).

Priroda (Nature) 1950 : No. 11 : 56-59. [Russian].

Juglans regia trees occasionally producing twin fruits, enclosed in symmetrical positions within a single pericarp, were observed in the Ukraine. Some of these fruits had three instead of the normal two divisions of the endocarp. The formation of the twin fruits appears to be due to the fission of ovaries during an early stage of development. Atavism is put forward as an alternative explanation.

2981. ČUHNO, D. F.

(**The walnut in the Ukraine**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 1 : 27-30. [Russian].

Reference is made to hardy forms of walnut selected at the Veselo-Bokovenskiĭ Dendrological Park, Kirovograd province, and the Trostjaneckii Forest Farm, Sumy province.

- 2982.

Proceedings of the Twenty-Ninth Annual Meeting of the Texas Pecan Growers Association, Tyler, Texas, July 11-12, 1950 : Pp. 70.

Romberg, L. D. and Progress report on the breeding of new pecan varieties. (pp. 12-21).

The aims of the breeding work being carried out at the Brownwood field station are summarized, with data concerning several promising seedlings from recent varietal crosses. The inheritance of numerous characters is being investigated, including dichogamy and date of fruit ripening.

Krezdorn, A. H. *Some observations of the Burkett disease of pecan.*
(pp. 34-37).

The possible cause of deterioration of the variety Burkett in Texas is discussed. Other varieties growing under the same conditions, adjacent to plots of Burkett or mixed with this variety, are resistant.

Zajicek, J. *Should we topwork our pecan groves.* (pp. 47-48).

The desirability of top working varieties grown commercially is discussed. In Bell County the varieties Schley, Desirable, Mahan, Delmas and Success have been used to increase yields but three western varieties Burkett, Texas Prolific and Squirrel Delight proved highly susceptible to scab.

Hander, N. H. *Pecan varieties for central Texas and (East Texas).*
(pp. 48-52).

Varieties being grown in central Texas are listed with respect to their vigour, foliage condition, resistance to scab and leaf spot, yielding capacity and nut characters such as size, flavour, attractive appearance, oil content and crackability. Texhan is superior in most respects in this area.

Cardwell, W. W. *Pecan varieties for South Texas.* (p. 53).

The varieties Success and Evans have outyielded others at the Luling Farm.

2983. SHARPE, R. H. and
 BLACKMON, G. H.
 A study of plot size and experimental design with pecan yield data.
 Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 236-41.

Use of single tree plots with replicate blocks as compact as possible was found to be the most efficient method of securing data on pecan yields.

2984. PAVARI, A.
 La lotta contro il cancro corticale del castagno. (**The control of chestnut blight**).
 Humus, Milano 1951 : 7 : No. 3 : 9-13.

Information is given concerning the continued spread of blight (*Endothia parasitica*) in Italian chestnut plantations. A very large number of chestnuts have been collected in all parts of Italy and elsewhere for inoculation tests, to make sure whether any resistant individuals exist. Extensive trials of resistant Chinese chestnuts (*Castanea mollissima*) imported from America have shown that some of them bear chestnuts of high quality suitable for the Italian market and these are being multiplied.

2985. JOHANSSON, E.
 Sortförsök med hassel vid Alnarp 1938-1950. (**Variety trial with hazel nuts at Alnarp 1938-1950**).
 Medd. Stat. Trädgårdsförsök 1951 : No. 63 : Pp. 11.

JOHANSSON, E.
Sortförsök med hassel. (**Variety trial with hazel nuts**).
Försök och Forskning 1951 : 8 : p. 4.

The wild hazel of Sweden belongs to *Corylus Avellana*, while the varieties with large nuts, cultivated to some extent in southern Sweden, belong to *C. maxima* or are interspecific hybrids between various species.

In a trial of 11 varieties, including Kentish Filbert and White Filbert which proved to be synonymous, hardiness, yield, quality and size of nut were recorded. Tidig Lång Zeller [Early Long Filbert] gave the best yield, 20 kg. per bush. The most hardy varieties were Tidig Lång Zeller, Cosford and Géant de Halle [Halle Giant], the first two of these being apparently also superior to the rest in quality and flavour.

Descriptions are given of the varieties and their origin.

2986. VENKATANARAYANA, G.
Annual Report of the Coconut Research Station, Kasaragod, for 1947-48 : Pp. 11.

Experiments have been carried out at Kasaragod, Madras, to study the influence of the male parent upon the thickness of the endosperm in the resulting nut. Compared with self-pollinated trees producing thin kernels, the cross thin kernel ♀ x thick kernel ♂ resulted in increased kernel thickness. The cross thick kernel ♀ x thin kernel ♂ did not give nuts showing any significant reduction in endosperm thickness, compared with those obtained from self-pollinated trees bearing thick kernels. Open-pollinated progenies of promising mother trees have been established.

2987. LIYANAGE, D. V.
The relative merits of first and second bunch coconuts for seed purposes.
Trop. Agriculturist 1950 : 106 : 151-55.

A study of seedling and adult palms has shown that for seed purposes on estates the first and second bunch nuts are equally suitable.

2988. NIXON, R. W.
Date culture in the United States.
Circ. U.S. Dep. Agric. 1951 : No. 728 : Pp. 57.

A revised edition of this circular is now available (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 928).

2989. MONCIERO.
Contribution à l'étude du palmier dattier. 1. Premiers résultats d'essais de fumure et de ciselage. 2. Fécondation mécanique des palmiers dattiers. (**Contribution to the study of the date palm. 1. Preliminary results of manuring and thinning experiments. 2. Mechanical fertilization of date palms**).
Ann. Inst. Agric. Serv. Recherches Exp. Agric. Algérie 1950 : 5 : No. 6 : Pp. 12.

An ordinary portable dusting apparatus with certain modifications has been successfully used for pollinating date palms without mounting the trees. The great saving of time and labour would also allow of a second pollination where, owing to unfavourable weather or other conditions, a first pollination had not been effective.

Experiments still in progress showed in 1949 that a single pollination operation carried out from one to seven days after the opening of the spathe was effective.

Preserving branches from the previous season to provide pollen for early female crowns has been found to give an unsatisfactory set.

2990. OSIPOV, I. G.
The date palm in Turkmenia.
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 3 : 49-51.
[Russian].

Acclimatization work with date in the Kizil-Atrek district of Turkmenia showed promise. The initial material comprised suckers and stones of different varieties. Changes in the inheritance of dates, including earlier bearing, are reported. Breeding from the available material for early maturity, good yielding capacity and quality of drupes is advocated.

2991. BÓTTARI, V. and SPINA, P.
Ricerche sulla impollinazione di alcune varietà di olivo coltivate in Sicilia. (**Investigations on pollination of some varieties of olive grown in Sicily**).

Ann. Sper. Agrar., Roma 1950 : 4 : 1007-22.

Brief descriptions are given of olive varieties grown in certain parts of Sicily, with notes on nomenclature (including synonyms), sterility and fertility, and selfing or crossing.

An appendix deals with the formation of pseudodrupes which, except in the self fertile variety Ogliarola Messinese, were found nearly everywhere in the districts studied.

2992. MORETTINI, A.
Ulteriore contributo allo studio dell'aborto dell'ovario nel fiore dell'olivo. (**Further contribution to the study of ovary abortion in the flower of the olive**).

Ann. Sper. Agrar., Roma 1951 : 5 : 309-29.

The flowers of each variety cultivated in central Italy show a characteristic percentage of abortion under normal environmental conditions.

2993. D'AMATO, F.
Fenomeni di auto-incompatibilità nel corniolo (*Cornus Mas* L.)? [**The phenomenon of self incompatibility in the Cornelian cherry (*C. Mas* L.) ?**]

Nuovo G. Bot. Ital. 1947 : 54 : 365-67.

A case of what is believed to be self incompatibility is reported in a tree of *C. Mas* from Lund, Sweden.

2994. HUME, E. P.
Growing avocados in Puerto Rico.

Circ. P.R. (Fed.) Agric. Exp. Sta. 1951 : No. 33 : Pp. 53.

Detailed reference is made to the characteristics of varieties of avocado grown commercially in Puerto Rico. Most forms derived from the Mexican *Persea americana* var. *drymifolia* are unsuitable for local conditions; varieties of the Guatemalan race and hybrids between Guatemalan and West Indian forms have proved superior. Attempts are being made to develop hybrids with fruit better suited for export, and to lengthen the ripening season.

2995. Algemene Veredelingsdagen van het I.V.T. (**Plant Breeding Day for all held by the IVT**).

Fruittelt 1951 : 41 : 190-91.

At the meeting for plant breeders at the Instituut voor de Veredeling van Tuinbouwgewassen [Institute for the Breeding of Horticultural Plants], A. J. ter Pelkwijk spoke on "Prospects for new small fruits." Many wild fruits, some of which show a wide range of variation and have been undergoing selection for improvement in quality in the USA or elsewhere, were discussed with special reference to their possibilities for Holland. The list included species of *Vaccinium*, brambles, *Hippophae*, *Amelanchier*, *Elaeagnus*, *Viburnum*, *Cornus*, *Chaenomeles*, *Sambucus*, *Actinidia*, *Rosa*, *Berberis* and *Lonicera*.

2996. JOHANSSON, E.
Hallonodling. (**Raspberry cultivation**).
Årsb. Svensk. Jordbr. Forsk. 1951 : 95-105.

Mention is made of the wild species *Rubus Idaeus* var. *vulgatus* found in Sweden, and *R. Idaeus* var. *strigosus* found in USA.

The raspberries grown in Sweden are mostly English, Dutch or German varieties, but among the varieties here described are: Asker, probably of Norwegian origin and very

hardy, but not suited to southern Sweden; and Mitra and Miranda, both bred at Alnarp (cf. *Plant Breeding Abstracts*, Vol. XIX, Absts. 1296 and 1297).

2997. WILLIAMS, C. F.

Influence of parentage in species hybridization of raspberries.

Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 149-56.

In work on the development of raspberries adapted to the Coastal Plain and Lower Piedmont regions of North Carolina, hybridization between varieties of American red raspberry and introduced species has been carried out. Most use has been made of *Rubus biflorus* and data are given on F_1 seedlings from crosses between *R. biflorus* and American varieties and back crosses of these seedlings with American varieties; the characters referred to comprise vigour, disease resistance and fruit size. In addition, F_1 hybrids of *R. parvifolius*, *R. coreanus* and *R. Kuntzeanus* are described. Back crosses of these F_1 hybrids to American varieties have been successful.

Only small differences in vigour and disease resistance occurred when different American varieties were used as parents in the F_1 and in back-crossing. The Asiatic species studied carry genes which are partially dominant, such as those for vigour and disease resistance. Progenies with good quality fruit were obtained from crosses involving standard American varieties. In back-crossing, the choice of the hybrid parent appears to be especially important and should be based on vigour and disease resistance. Many vigorous hybrids, however, are relatively sterile; this sterility is sometimes transmitted to the progeny; it is not known whether this sterility is due to genetic factors or chromosomal irregularities. In order to find the most promising combinations, many crosses with different hybrid selections are made; relatively small populations of about 100 are raised. Crosses showing promise are repeated and larger populations grown. In recent years much of the breeding work has been directed towards combining the desirable characters of several species in a single selection; some of the selections obtained are satisfactory in all respects except flavour; it is expected that it will be possible to overcome this defect. Selections of these multiple hybrids are outstanding with regard to vigour, disease resistance, productivity and fruit size; the fruits of many of the selections are firm, cohesive and attractive.

2998.

Bush fruits.

Bull. Minist. Agric., Lond. 1951 : No. 4 : Pp. 36.

Descriptive notes on black currant, red currant and gooseberry varieties suitable for growing in England are included.

2999. JOHANSSON, E.

Sortförsök med svarta vinbär. (**Variety trials with black currants**).

Försök och Forskning 1951 : 8 : 20-21.

At the end of 1950, variety trials of black currants were laid down at 30 places in Sweden and the present report gives the result from 12 localities, of which eight were in southern or central Sweden and four in Norrland. Yield, vitamin C content and flavour were recorded. On clay soils in southern Sweden the Wellington varieties and Silvergieter were the best, while in central Sweden Wellington and Brödorp were regarded as the most suitable. For northern Sweden Brödorp is recommended as the most reliable because of its hardiness and productivity, and Wellington could also be grown there in many cases. Brödorp is suitable also for southern Sweden as an early ripening variety.

3000. NYHLÉN, Å.

Sortförsök med krusbär vid Nyckelby 1942-1950.

(**Variety trials with gooseberries at Nyckelby, 1942-1950**).

Årsb. Svensk. Jordbr. Forsk. 1951 : 106-11.

In 1942 a trial of 14 varieties of yellow, green and red gooseberries was begun and at the same time a collection of 119 varieties was laid down. In the trials Champagne Green,

Triumphant and Achilles, closely followed by Whitesmith, gave the best yields and the same varieties also did well in the collection. They were not specially subject to mildew and their keeping quality was classed as good or average. In the collection, the variety Thaser White, which gave a remarkably high yield and proved fairly free from mildew, will be studied further.

3001. KIHARA, H.
(**The interspecific hybrid *Rosa multiflora* x *R. rugosa***).
Jap. J. Genet. 1944 : 20 : 55-58. [Japanese].

The F_1 hybrid of *R. multiflora* ($2n = 14$) x *R. rugosa* ($2n = 14$) is sterile, but 1-7 pairs are formed at metaphase, even though, according to Hurst, the two species have different genomes.

3002. DRAIN, B. D. and
ROEVER, W. E.
Tennessean strawberry.
Circ. Tenn. Agric. Exp. Sta. 1950 : No. 105 : Pp. 4.

The strawberry Tennessean is described in detail (cf. Abst. 1354).

3003. FLEMING, H. K.
1950 strawberry variety trials in Erie County, Pennsylvania.
Progr. Rep. Pa. Agric. Exp. Sta. 1951 : No. 41 : Pp. 3.

The varieties Temple and Fairland have shown greatest adaptability to the conditions of Erie County, Pa.; they are recommended to growers in this region.

3004. WILSON, G. B.
Cytological studies in the Musae. IV. Tetrad shapes.
Trans. Amer. Microscop. Soc. 1949 : 68 : 217-21.

An investigation of the irregular tetrahedral shapes, designated S, T and L, appearing at microsporogenesis in diploid species of *Musa* has led to the conclusion that the shape of each tetrad is determined by the orientation of the spindle at the second division. Spindle orientation depends on the shape of the dyads; those determining T and L forms are longer, with respect to their widths, than those from which S types arise. Dyad shapes are correlated with the shapes of premeiotic pollen mother cells; those which deviate widely from the spherical form generally give rise to tetrads of irregular shape.

3005. DUTT, M.,
SIRCAR, S. and
DATTA, C.
Physiological studies on diploid and polyploid varieties of banana (*Musa paradisiaca* L.).
Sci. and Cult. 1950 : 16 : p. 215.

Diploid, triploid and tetraploid bananas were compared for total sugar, total nitrogen, ash and calcium content of the leaves and fruits. The most significant difference noted was the decrease in ash and calcium content with increase in the degree of polyploidy.

3006. BALDWIN, J. T. (JUN.) and
SPEESE, B. M.
Cytogeography of *Physalis* in West Africa.
Bull. Torrey Bot. Cl. 1951 : 78 : 254-57.

The following chromosome numbers of the three representatives of *Physalis* in West Africa are reported: *Ph. angulata*, $2n = 48$; *Ph. peruviana* 48 and *Ph. divaricata* 24. It is

suggested that discrepancies in the literature regarding the chromosome numbers of these species reflect erroneous taxonomic identification.

3007. NELSON, K. E.
Factors influencing the infection of table grapes by *Botrytis cinerea* (Pers.).
 Phytopathology 1951 : 41 : 319-26.

Varietal differences in the susceptibility of Californian grapes to *B. cinerea* were observed under controlled conditions in respect of temperature and humidity. The variety Tokay was more susceptible than Emperor, having a shorter infection period and higher incidence of infection. Grapes with a high sugar content show least resistance to the disease.

3008. MAGER, M. I.
(The link between science and industry grows stronger).
 Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 :
 No. 1 : 52-55. [Russian].

Reference is made to breeding work with vines conducted at the Kišenev Branch of the Magarač Institute. Selection of Moldavian yeasts has given the promising pure cultures Romaneșty [Rumanian] and Magarač. Romaneșty remains active at 5° C. and in concentrations of 19% alcohol; Magarač is tolerant of 480 mg/l. sulphur dioxide.

3009. LONG, J.
 Que faut-il penser des hybrides en viticulture? **(What must one think of hybrids in viticulture?)**
 Bull. Techn. Inform. Ingén. Serv. Agric. 1951 : No. 56 : 62-67.

Views on the merits and defects of hybrid vines are mentioned with notes on some of the chief hybrids grown at present in various parts of France.

3010. LOOMIS, N. H.
Use of Champanel and Dog Ridge grapes in breeding.
 Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 140-44.

In grape breeding at the US Horticultural Field Station, Meridan, Miss., the varieties Champanel and Dog Ridge have been widely used. The former is a *Vitis Champini* x *V. Labrusca* hybrid, possibly with a trace of *V. vinifera* parentage; the latter is a pure selection of *V. Champini*. Both have dark fruit, low in sugar and high in acid until fully ripened. From a study of crosses of the perfect flowered variety Champanel and the pistillate flowered variety Dog Ridge with other grapes, it has been found that crosses of perfect flowered varieties result in at least twice as many perfect flowered seedlings as crosses of pistillate and perfect flowered types. All the seedlings from these crosses bore dark coloured fruit, indicating that both Champanel and Dog Ridge are homozygous with respect to fruit colour. Champanel has proved to be a more valuable parent than Dog Ridge.

3011. PIROVANO, A. and
 COSMO, I.
 Gli incroci Pirovano nell'Isola di Rodi. Osservazioni e rilievi dell'annata 1949. **(The Pirovano crosses in the Island of Rhodes. Observations and remarks for the year 1949).**
 Ann. Sper. Agrar., Roma 1950 : 4 : 975-1005.

The establishment of the Paradisi vineyards on the Island of Rhodes is described with detailed records of the performance of about 300 of Pirovano's hybrids, bred in Italy and transferred to the hot, arid climate of the island.

3012. MÜLLER-STOLL, W. R.
 Mutative Färbungsänderungen bei Weintrauben. (**Colour mutations in grapes**).
 Züchter 1950 : 20 : 288-91.

In this review of colour changes observed from time to time in grapes, three types of alteration are distinguished: (1) the rare production of white grapes on a black variety; (2) the more frequent change in the reverse direction; and (3) the development of variegated berries through local failure of chlorophyll formation in the plastids.

3013. LEVADOUX, L.
 La sélection des greffons. (**The selection of scions**).
 Bull. Techn. Inform. Serv. Agric. 1951 : No. 56 : 52-60.

The role of selection in vine improvement is explained with reference to the value of the clone, bud mutations and the practice of clonal selection. Mass selection and its uses are also briefly mentioned in connexion with its practice by French vine growers.

3014. STEINGRUBER, P. and
 MÜLLNER, L.
 Dreissig Jahre Rebenzüchtung an der Höheren Bundes-Lehr- und Versuchsanstalt für Wein-, Obst- und Gartenbau in Klosterneuburg. (**Thirty years of vine breeding at the Austrian College and Research Institute at Klosterneuburg for Viticulture, Fruit Cultivation and Horticulture**).
 Mitt. höh. Bundeslehr- u. VersAnst. Wein-, Obst- u. Gartenbau Wien-Klosterneuburg, Bienenkunde Wien-Grinzing 1951 : 1 : 45-51.

A historical summary is given of the development and main activities of the Vine Breeding Station, which became part of the Klosterneuburg Institute in 1921; the breeding material at various stages and the methods of working on breeding problems are briefly described. A list is included of the vines comprising the clonal material in the various gardens of the Institute.

Change of the district in which previously satisfactory clones are grown has been proved to have deleterious effects.

The importance of isolating forms is shown in the example of a type of Portugieser blau [Portuguese Blue] which has green leaves even in autumn. This vine gave three times as high a yield as the red-leaved type, the same high yields being obtained on three different stocks.

3015. *GRAMOTENKO, P. M.
 (**Promising hybrids of the variety Puhljakovskii**).
 Vinodelie Vinogradarstvo SSSR. (Wine-making Viticult. USSR) 1951 :
 No. 1 : 36-38. [Russian].

New varieties of vines were bred from Puhljakovskii and Muscat de Hambourg at the RSFSR Scientific Research Institute of Viticulture and Wine Making.

Élite 50-13-17 has been named Oboepolyi Puhljakovskii [Perfect flowered Puhljakovskii]. It produces compact conical bunches weighing 150 to 270 gm. The grapes are large, oval and greenish white, with juicy flesh and thickish skin. Their flavour is good. The variety has high yielding capacity and shows resistance to shedding and development of undersized fruits. It is earlier than Puhljakovskii.

Élite 50-10-1 is a productive variety reaching maturity in September and having perfect flowers. It shows resistance to shedding. It has large, oval, dark red grapes, which grow in compact bunches weighing between 160 and 370 gm. The grapes will keep until January. The flavour is good.

* An extended summary of this paper is on file at the Bureau.

Élite 50-12-8 bears bisexual flowers. The bunches are medium large, conical and may be loose or firm. The grapes are large, oval and greenish white. The flesh is juicy and the skin thickish but tender. The flavour is good.

3016. SNYDER, E. and
HARMON, F. N.
Growth comparisons of Vinifera grape varieties after growing 44 years on Rupestris St. George rootstock.
Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 169-72.

Varieties of *Vitis vinifera* grafted on Rupestris St. George rootstock showed good vigour and satisfactory fruiting at the age of 44 years in a plot at Fresno, Calif. Varietal differences in inherent vigour have been noted, as indicated by trunk measurements and weight of prunings.

3017. HIZKILOV, I. H.
(Little known indigenous varieties of vines in Tadžikistan).
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 :
No. 1 : 32-34. [Russian].

A collection of over 200 varieties of vines indigenous to Tadžikistan was made by an expedition conducted by the Magarač Institute and was studied at the institute's Central Asiatic branch station. The vines comprised 115 white, 15 pink, 35 red and 53 black varieties.

The best varieties in the Kuljabskaja, Garmskaja and former Uratjabinskaja provinces for making wine, and for dessert grapes and for their dried product are listed and briefly described. Some varieties are promising as material in breeding for hardiness, resistance to drought and other economic properties. Mention is made of Džanati, Čilgi Hufaki, Doroi Surh, Šakarmagzi, Fahri and Tašrifbegi, which are remarkable for earliness and of Sini Gov, Gevangur, Surhi, Trangoni Hrozmoni, Rasmi and Hamirak noted for their good keeping properties and transportability. The varieties Lalmagi, Siehi Maıda, Surhi, Luftoki Kivroni, Siehi Kalon Kivroni and Gevangur are suitable for cultivation without irrigation.

3018. REGEL, C.
An der Nordostgrenze des Weinbaus. **(At the northeast boundary of vine growing).**
Züchter 1950 : 20 : 275-82.

A review is given of vine cultivation and the development of hardy vine varieties in White Russia, Lithuania, Latvia and Estonia. Mičurin's hybrids are discussed.

3019. SKUINJ, K. P.
(For a northward extension of viticulture).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 1 : 35-41.
[Russian].

Varieties sufficiently early and hardy for cultivation in the Moscow, Voronež, Tambov, Orel, Saratov and Kuibyšev provinces, Latvia, White Russia, northern Ukraine, Siberia and the Primorskii territory are listed. Much importance is attached to breeding hardy local varieties with short growth periods. Reference is made to new varieties Severnyĭ [Northern] and Zarja Severa [Dawn of the North], which have been tested by the Central Ampelographic Commission.

3020. BOUS, A. K.

(Viticulture in the Primorje).Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 :
No. 2 : 33-36. [Russian].

Varieties of vines most adapted to the severe climatic conditions of the Soviet Far East are described. They are Al'fa [Alpha], from *Labrusca* x *Riparia*, Taežnyi Izumrud [Taiga Emerald], from *Labrusca* x *Riparia*, Prima [62], a seedling derived from *Labrusca*, Chasselas Ramminga [Ramming's Chasselas], from 64 x Chasselas Muskatnyi [Muscat Chasselas], Dal'nevostochnyi Ramminga [Ramming's Far Eastern], from Dal'nevostochnyi Tihonova [Tihonov's Far Eastern] x Taežnyi Izumrud and Amurskii Oboepolyi [Amur Perfect Flower], a variety derived from a wild form of *V. amurensis*. Besides the varieties listed, such early European vines as Chasselas Belyi [White Chasselas], Perle de Csaba and Lignant will grow in sheltered places when grafted on hardy stocks of Al'fa, Dal'nevostochnyi Ramminga and Dal'nevostochnyi Tihonova.

3021. NEGRULJ, A. M. and

RUBIN, S. M.

(Vine breeding in the USSR after the death of I. V. Mičurin).Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :
38-41. [Russian].

Some results of the breeding work with vines here reported have been previously reviewed (cf. Abst. 2154). The supplementary report refers to promising new hybrids developed at the Mičurin Central Genetical Laboratory from Madeleine Angevine x *Vitis amurensis*, Sejanec Malengra [Malingre Seedling] x 135, Sejanec Malengra x Černyi Sladkii [Sweet Black], Sejanec Malingra x Gitš, Sejanec Malengra x Šasla Muskatnyi [Muscat Chasselas], Sejanec Malengra x Halili, Čuaš x Malengr Ranni [Early Malingre] and Russkii Konkord [Russian Concord] x Ezenderi. At Kuibyšev, the hybrids from crosses involving Madeleine Angevine as a female parent and Malengr Ranni, Chasselas and Černyi Sladkii as male varieties showed promise.

At Novočerkassk, several hybrids from Puhljakovskii x Muscat de Hambourg, Puhljakovskii x *V. amurensis*, *V. amurensis* x Galant, Muskat Aleksandriiskii [Alexandria Muscat] x *V. amurensis* and *V. amurensis* x Černyi Sladkii were selected.

At the Anapa Research Station, élites of several hybrids including Puhljakovskii x Muskat Aleksandriiskii, Čuaš x Muscat de Hambourg, Aligoté x Muscat de Hambourg and Tavriz x Muscat de Hambourg have been selected and are being multiplied.

At the Dagestan Research Station new varieties, including hybrids from Agadai x Muskat Aleksandriiskii have been developed. The material is being multiplied.

3022. POTAPENKO, JA. I.

(Breeding cold resistant high quality varieties of vines).Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 :
No. 2 : 26-30. [Russian].

At the RSFSR Scientific Research Institute of Viticulture and Wine Making, *Vitis amurensis* and its crosses with European vines are regarded as the most suitable material for transmitting hardiness to their hybrid progenies. American vines, which are short day plants and have long growth periods under Novočerkassk conditions, may be useful, in crosses with *V. amurensis*, to breeders in Siberia and in the Soviet Far East.

Descriptions are given of the promising hardy hybrids 111-4-15-69, 111-4-17-30, 111-4-17-34, 111-4-17-50, 111-4-18-84, 111-4-20-58, 111-4-21-33, 111-4-22-59, 111-4-24-57 and 111-4-28-16, which were obtained at the institute from pollinating the variety Severnyi [Northern] with a pollen mixture of several Muscat varieties. Severnyi was bred from Sejanec Malengra [Malingre Seedling] x *V. amurensis*. All but three of these hybrids have perfect flowers and all of them yield high quality grapes and possess other desirable characters.

Many hybrids from this cross are still under observation. Other promising hybrids with attractive grapes of different colour and having the high quality of European varieties were produced by pollinating Muscat Belyi [White Muscat], Sibirjkovoi, Aligoté, Portugizer [Portuguese], Riesling and Pino Seryi [Grey Pinot] with pollen mixtures or pollen from the hybrids between European varieties and *V. amurensis*, including Madeleine Angevine x *V. amurensis*, Plečistik [Broad Shoulder] x *V. amurensis* and Puhljakovskii x *V. amurensis*.

3023. BOUBALS, D. and

HUGLIN, P.

Observations sur la sensibilité au salant de certaines espèces et hybrides d'espèces du genre *Vitis*. (**Observations on the sensitivity of certain species and interspecific hybrids of the genus *Vitis* to saline soil**).

Progr. Agric. Vitic. 1951 : 68 : 145-46.

According to a survey carried out on vineyards of the National School of Agriculture, Montpellier, the vines sensitive to chloride in the soil included: *Vitis rupestris* varieties, *V. arizonica* and all the specimens observed of *V. monticola*, with, in addition, the hybrids Le Sioux (Cordifolia-Rupestris), 3905 C (Bourrisquou-Rupestris) and Riparia-Rupestris-Berlandieri Daignère. The following species and stocks, however, were unaffected by the presence of chlorides: *V. rupestris*, *V. aestivalis*, *V. Labrusca*, *V. cordifolia* and the Rupestris-Berlandieri hybrid stocks, Simpsoni solonis, 90 R and 57 R.

3024. ROMAŠKO, I. S.

(**The varietal susceptibility to the leaf type *Phylloxera* of vines**).

Vinodelie Vinogradarstvo SSSR. (Wine-making Viticult. USSR) 1951 : No. 3 : 38-40. [Russian].

Susceptibility to development of leaf galls caused by *Phylloxera* was studied at the Soči Branch of the Magarač Institute in several vine species, varieties and hybrids.

Of the various vines used as stocks the hybrids between *Vitis Labrusca* and *V. vinifera* proved the least susceptible. The only species found to be immune from *Phylloxera* were *V. rotundifolia* and *V. Parthenocissus*.

There was great variation regarding resistance to *Phylloxera* in European vines, the least susceptible varieties being enumerated.

FORESTRY

3025. SYRACH-LARSEN, C.

Advances in forest genetics.

Unasylva 1951 : 5 : 15-19.

Methods of forest tree improvement are discussed with reference to preservation of the best types; transportation of pollen and grafts by air mail; the study of genotypes in tree shows, as in Denmark; the value of seed source gardens, especially in the exploitation of heterosis; and the general aims of breeding.

3026.

Actes du III^e Congrès Forestier Mondial. No. 3. Rapports Spéciaux. (**Proceedings of the III World Forestry Congress. No. 3. Special Papers**).

Helsinki 1950 : Pp. 377.

Guinier, Ph.

La question du peuplier. (*The question of the poplar*). (pp. 111-16).

Having pointed out the importance of the poplar, as a fast growing tree, for timber, the author briefly refers to the following questions: the species of poplars, their geographical origin and the types commonly found in cultivation in Europe; problems of botanical

classification; the work of the International Poplar Commission, in regard to identification of types, nomenclature and varietal control and its adoption in various European countries; the experimental study of types and methods of cultivation; the search for and the breeding of new types; progress in poplar research in Italy, Sweden, Holland, Belgium and France; and, finally, the need for disease resistant types.

Gustafsson, Å.

Conifer seed plantations: their structure and genetical principles. (pp. 117-19).

Three problems connected with conifer plantations as sources of seed are discussed: composition and organization of clone plantations; forcing of flowering in relation to selection in seedling plantations; and methods of progeny testing.

Seedling plantations, established with seed from clonal plantations or artificial crosses in natural populations, are regarded as being of questionable value since forced flowering will automatically result in selection of genotypes characterized by early flowering; early and abundant flowering is often associated with poor economic characters and thus this method may not necessarily give plus or élite trees.

The following method is recommended for progeny testing of clones. Every clone should be fertilized by an artificial mixture of equal amounts of pollen from the other constituents. The progenies from the seed of individual clones should then be compared with the trees raised from a seed mixture of the whole plantation, with a view to discarding inferior clones. Observations should also be made on the breeding propensities of each clone. In the final test, seed of individual clones should be compared with the mixed seed from the whole plantation, obtained over a period of several years, to eliminate climatic and fortuitous factors, and these two kinds of seed should also be compared with standard material collected from natural stands of the provenance in question. In this way the original clone plantation will be successively evaluated and cleared of inferior clones and be transformed in a plantation producing abundant élite seed.

Houtzagers, G.

Génétique et sélection dans la silviculture Néerlandaise. (Genetics and selection in Dutch forestry). (pp. 120-25).

An account is given of the improvement of nursery stock of poplars in Holland, where by collaboration between various research and advisory institutions and by official inspections a method has been devised that ensures that only trees of known identity and provenance and guaranteed as disease resistant are allowed to be sold. Seven varieties belonging to six *Populus* species have been thus certified. Similar measures have been applied to nursery material of fruit trees.

A second method of poplar improvement has been hybridization between groups, such as *Aigeiros*, *Leuce* or *Tacamahaca*, to combine rapid growth, high production, suitability for vegetative propagation, desirable form, and resistance to diseases. A few bacterial canker resistant hybrids will be tested for the other characteristics mentioned and if found to be improved will be released to the Dutch trade.

Similar work has also been done in Holland on *Ulmus* and the Committee for the Control of Elm Disease (*Ceratostomella Ulmi*) has now at its disposal three hybrids, 62, 139 and 148, which will probably replace the highly susceptible *Ulmus hollandica*.

Fraxinus, *Robinia Pseudo-acacia* and *Pinus sylvestris* are also undergoing selection for improvement in various respects. Seed control of *P. sylvestris* should, it is thought, be modelled more on the Swedish pattern with its surveys of stands composed of high grade phenotypes from which mother trees are chosen for the production of selected seed.

Johnsson, H.

Experiences and results of ten years' breeding experiments at the Swedish Forest Tree Breeding Association. (pp. 126-30).

Breeding work in Sweden is reviewed with reference to: selection of stands and individual trees, progeny testing of selected material and vegetative propagation of the best mother trees; strain building; intraspecific and interspecific hybridization; use of natural and artificial polyploids; and inbreeding and crossing of inbred trees.

Karpinski, J.

The problem of races and polyploids of forest trees, as also the problem of stand types as genetical problems in forestry. (pp. 131-34).

Representing Poland, the author stresses the value of the methods of Mičurin and Lysenko in forest tree improvement. The general proposals put forward for research include the following fields of enquiry: vitality of races and polyploid forms in the place of their natural origin; inheritance of characters of races and polyploids in the natural habitats of the trees and after transference to other environments; correlations of vitality and other features with environmental factors and the causes of the correlations; suitability of natural races and polyploids for acclimatization; breeding value of artificial races and polyploids; environmental conditions essential for the maintenance of vitality and the inheritance of characters in artificial races and polyploids; registration of areas yielding valuable races and polyploids with a view to studying environmental effects; and genetical and several other aspects of forest biocenosis.

Sarvas, R.

Forest genetics in Finland. (pp. 135-37).

A programme of forest tree breeding has recently been initiated in Finland. Considerable attention is being given to seed plantations and work has already been carried out on the selection of suitable stands and trees of *Pinus sylvestris*, *Picea excelsa*, *Betula verrucosa* and *B. pubescens*. A breeding station has been established at Ruotsinkylä, near Helsinki, where propagation is in progress. Several studies on the flowering of forest trees are also under way.

3027. MATTHEWS, J. D.

Forest genetics.

Nature, Lond. 1951 : 167 : p. 764.

At the meeting of section K of the British Association, Syrach Larsen presented a general account of the tree breeding methods he has developed at the Horsholm Arboretum, Denmark; B. Lindquist spoke of birch improvement in Sweden. J. D. Matthews contributed a short description of improvement work in Great Britain, emphasizing the importance of the survey of potential seed producing populations of beech, oak, ash, Scots pine, Corsican pine, Sitka spruce and larch, now in progress. A number of seed sources have been located for each of these species. The selection of individuals from which seed orchards are to be formed is being made concurrently with the above survey. In the discussion following these papers, it was stressed that, if full use is to be made of improved growing stock, the value of genetics among practising foresters must be recognized.

3028. RUBCOV, N. I.

(New data on coalescence of the root systems of some forest trees).

Agrobiologija (Agrobiology) 1950 : No. 6 : 57-65. [Russian].

Coalescence of root systems of different individuals of the same tree species, which may lead to vegetative hybridization in nature, occurred most frequently in *Populus*, *Betula* and *Acer*.

3029. MANZELIĬ, I. I.

(Unscientific theory and practice in forestry).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 8 : 74-78. [Russian].

Papers published at a Soviet forestry institute are criticized for containing views on intraspecific and interspecific relations between forest trees contradicting Mičurinite theory. In an editorial footnote, Lysenko's theory on the absence of competition between individuals of the same species is reaffirmed. Scientists holding different views to Lysenko are asked to state it openly and to present evidence supporting their ideas.

3030. FLOYD, C.
Denmark, 1950.

Quart. J. For. 1951 : 45 : 5-15.

An account of the Royal Forestry Society's visit to Denmark in September 1950 includes a brief description of methods of breeding *Fagus*, *Larix* and *Fraxinus* in Danish nurseries (cf. Abst. 2157).

3031. ALJBENSKIĬ, A. V.
(The dominance of short growth period in hybrids of forest trees).
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :
70-71. [Russian].

The hardiness of several interspecific hybrids of poplar in the Stalingrad province was assessed by their capacity for early bud development. Observations showed that the growth periods of the interspecific hybrids were either as long as, or shorter than the growth periods of the pure species. Some of the hybrids acquired a high degree of resistance to cold under Stalingrad conditions. The most promising of these are the hybrids between *Populus pyramidalis* and *P. Simonii*.

3032. ZIRKLE, C.
A possible early eighteenth century record of introgression in oaks.
J. Hered. 1951 : 41 : 315-17.

The meaning of the word bastard in the early botanical literature is discussed and a possible record in 1755 of introgression between *Quercus falcata* and *Q. rubra* cited.

3033. GRAVATT, G. F.
Observations on some new or undetermined tree diseases in Europe.
Phytopathology 1951 : 41 : p. 561. (Abst.).

The diseases mentioned include chestnut blight (*Endothia parasitica*) occurring on oaks in Italy. The European species, *Quercus Ilex*, *Q. sessiliflora* and *Q. pubescens*, are all susceptible but American species, with the exception of *Q. stellata*, appear to be resistant.

3034. PICCAROLO, G.
La pioppicoltura nella Valle padana. (Poplar cultivation in the Po valley).
Ital. Agric. 1951 : 88 : 341-52.

The majority of the poplars cultivated in the Po valley are natural hybrids between the local *Populus nigra* and various American poplars grouped under the designation *P. deltoides*. Other types that have proved popular include certain hybrids of *P. alba* x *P. tremula* known as *P. canescens*. Selected clones of the best types from the point of view of disease resistance and growth characteristics are now available for planting. These include forms resistant to spring defoliation, aphid (*Phloeomyzus*), certain root rots and certain bacterial stem rots. The role they are playing in improving the quality of the poplars produced in the area in question is illustrated in some general observations on poplar cultivation.

3035. ANDERSSON, E. and
STRAND, L.
Några data från två jämförande försöksodlingar med asp. (Some data from two comparative experimental plots of aspen).
Svensk PappTidn. 1951 : 54 : 81-92.
Medd. Föreningen för Växtförädling av Skogsträd : No. 54.

A study, still in its early stages, is being made of growth variations in experimental plantations of the Association of Forest Tree Breeding in Sweden (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2120). In the present paper, dealing mainly with two small

observational experiments at Brunsberg, Värmland, growth measurements are cited showing that so far the hybrid aspen (*Populus tremuloides* x *P. tremula*) has been superior in mean height and diameter to common aspen progenies (*P. tremula* x *P. tremula*) and to the grey poplar (*P. alba* x *P. tremula*). The *P. tremuloides* x *P. tremula* hybrid was very resistant to *Fusicladium radiosum* and almost equally so to *Melampsora tremula*. The grey poplar suffered more from *Cytospora chrysosperma* damage than either the aspen or the hybrid aspen.

3036. HOUTZAGERS, G.
Bosbouw en bosbouwkundig onderzoek in de Verenigde Staten van Amerika. VII, VIII. (**Sylviculture and forestry research in the USA. VII, VIII.**)
Tijdschr. Ned. Heidemaatsch. 1951 : 62 : 162-67; 189-93.

A critical review is given of poplar hybridization and selection carried out in USA. American methods and standards are compared with Dutch in estimating the value of American results for forestry in Holland.

3037. RUNQUIST, E. W.
Ett fall av androgyna hängen hos *Populus tremula* L. (**A case of androgynous catkins in *P. tremula* L.**)
Bot. Notiser 1951 : No. 2 : 188-91.

Morphological details are given of the types of flowers found in androgynous catkins that were found in association with hermaphrodite flowers in a clone of three trees of *P. tremula* growing in northern Sweden. Seedlings raised from seed from some of the abnormal catkins are thought to be the result of self pollination.

A structural change in the chromosomes or a trisomic sex chromosome may be the cause of the anomaly.

3038. CIFERRI, R.
La pioppicoltura italiana in relazione alle malattie del pioppo. (**Italian poplar growing in relation to poplar diseases.**)
Humus, Milano 1951 : 7 : No. 4 : 11-15.

One of the most serious poplar diseases in Italy is the canker caused by *Chondroplea populea* (= *Dothichiza populea*) but the fast growing poplars now being planted seem less prone to it than the old fashioned kinds. Defoliation caused by *Endostigma Pollaccia* (= *Venturia Napicladium*) is equally serious but several hybrids between the Virginian and the black poplar, and some imported forms, are resistant. Certain hybrid clones are mentioned as possessing resistance to both the above diseases and to bacterial canker.

3039. BRINK, G. and
ENDE, G. V.D.
Verslag van het onderzoek naar de Populierenkanker in 1948 en 1949.
(**Report of the investigation on canker of poplars in 1948 and 1949.**)
Meded. Ned. Heidemaatschappij 1951 : No. 13 : Pp. 15.

A detailed account of the results of research in Holland on the resistance of poplar species to canker (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1232) is amplified by tabular data revealing changes from resistance to susceptibility in certain species. Such changes must be taken into account in testing new varieties for susceptibility. The relations between early budding and degree and duration of susceptibility are discussed.

3040. LINDQUIST, B.
The improvement of birch.
Quart. J. For. 1951 : 45 : 156-60.

Betula verrucosa is the principal species involved in a breeding programme by which birch improvement is being attempted in Sweden. As the preliminary work depends on careful

selection of élite trees, the phenotypical concept of an élite tree is emphasized. Cross pollination to produce élite seed is effected, on areas of one ha., between about 800 trees, each no higher than 4 m.; these are derived from nine élite trees by grafting on to slow growing stocks. The theoretical risk of loss in the F_2 by inbreeding will be offset by gains from the F_1 .

3041. W., N.
The Dutch elm disease.
 Amer. Nurserym. 1951 : 93 : No. 6 : 32-35.

A general account of the disease contains a reference to the reactions of species grown in the USA. *Ulmus parvifolia* and *U. pumila* are generally resistant, while *U. americana* and *U. carpinifolia* are susceptible. An individual specimen of *U. carpinifolia*, the Christine Buisman elm, has a high degree of resistance.

3042. RIGHTER, F. I. and
 DUFFIELD, J. W.
Interspecies hybrids in pines. A summary of interspecific crossings in the genus *Pinus* made at the Institute of Forest Genetics.
 J. Hered. 1951 : 42 : 75-80.

The results of the numerous interspecific crossings in *Pinus* made at the Institute of Forest Genetics, Calif., are summarized.

3043. RIGHTER, F. I. and
 DUFFIELD, J. W.
Hybrids between Ponderosa and Apache pine.
 J. For. 1951 : 49 : 345-49.

The first six years' growth of the hybrid *Pinus ponderosa* x *P. latifolia*, developed at the Institute of Forest Genetics, Placerville, Calif., has been compared with that of *P. ponderosa*. After rapid early development of a long tap root, the hybrid outgrows *P. ponderosa* both in height and girth. Attempts to incorporate resistance to the pine weevil are being made by additional hybridization with *P. Coulteri*.

3044. RUDOLF, P.
Variation in Scotch pine.
 Pap. Mich. Acad. Sci. 1948 : 34 : 57-68.

The adaptability of numerous races of *Pinus sylvestris*, from widely scattered regions, to the conditions of the Huron National Forest, Mich., has been observed during 14 years. The native *P. Banksiana*, with a high degree of disease resistance, is preferred for timber production in the area, although European forms of the variety Riga (*P. sylvestris*) have shown good growth combined with quality. Scots pines of central European origin, particularly from Austria, grow rapidly and are well suited for erosion control; races from subalpine areas of the Tyrol and parts of France are promising for Christmas tree production.

3045. YASUI, K.
(On polyploidy in the genus *Sequoia*).
 Jap. J. Genet. 1946 : 21 : 9-10. [Japanese].

Though *S. sempervirens* has $2n = 66$ chromosomes in contrast to the 22 chromosomes of *S. gigantea*, it is thought unlikely, in view of their taxonomic differences, that the latter is the progenitor of the former.

3046. AMANO, Y.

(Sexual chromosomes in *Taxus cuspidata*).

Jap. J. Genet. 1943 : 19 : 102-03. [Japanese].

Male, female and bisexual plants of *T. cuspidata* each have $2n = 24$ chromosomes. No structural features in the chromosome complements could be correlated with sex expression.

3047. KONDRATJUK, Ė. M.

(A new pine species from the Žitomir Polesje).

Bot. Ž. (Bot. J.), Kiiv 1950 : 7 : 52-59. [Ukrainian].

Latin and Ukrainian descriptions of a new species, *Pinus Fominii*, found in the Ukraine, are given.

VEGETABLES

3048. KEPPLER, E.

Entwicklung und neuere Züchtungserfolge der deutschen Gemüsezüchtung. (Development and recent successes of German vegetable breeding).

Z. Pflanzenz. 1951 : 29 : 302-17.

This paper is mainly a review of past and recent work on the breeding of the following vegetables: peas, dwarf and runner beans, tomatoes, cabbage, spinach, carrots, radishes, celery, kohlrabi and onions. Results of yield trials are reported for pedigree varieties of peas and dwarf and runner beans. The whole subject is mainly treated, not from the breeder's angle, but from the standpoint of the economic use of the varieties for the German food supply.

In the spinach variety Fortschritt [Progress], selected from the variety Riesen-Gaudry [Giant Gaudry], the proportion of male plants was successfully reduced. At the Institute for Plant Breeding of the Martin-Luther University at Halle-Wittenburg, work is being done on changing the normal sex ratio in spinach, applying the method of replacing the normal male plant by feminized male plants.

The only variety of kohlrabi mentioned as approved is Benarys Herbst [Benary's Autumn], a pale blue type derived from Goliath Weiss [Goliath White] x Blauer Speck [Blue Fat].

3049. BANGA, O.

De veredeling van kruisbestuivende groentegewassen. (The breeding of cross pollinated vegetable crops).

Erfelijkheid in Praktijk, Leiden 1951 : 12 : No. 1 : 1-3; No. 2 : 1-4.

The old methods which combined selection with seed production are shown to be unsound and it is suggested that three separate techniques should be used respectively for (1) breeding for particular improvements in a variety; (2) simultaneous maintenance and improvement of a variety, i.e. elite seed production; and (3) multiplication of elite seed to provide commercial seed. The various procedures necessary in carrying out these three tasks are described in detail.

3050. HARTMAIR, V.

Ergebnisse der Gemüsesortenversuche des Jahres 1950. (Results of the vegetable variety trials of the year 1950).

VersErgebn. Bundesanst. alp. Landw. Admont 1951 : No. 10 : Pp. 32.

Varieties of white and red cabbage, cauliflower, cabbage lettuce, garden beet, carrot, peas, dwarf bean and onion were tested in 18 different districts in alpine parts of eastern Austria at altitudes of 570-1720 m. Varieties from collections of Danish, Dutch and German breeders' seed were compared with those from home produced commercial seed, as regards their suitability for alpine conditions. The results are tabulated.

Generally, early Danish cabbage varieties were ready for marketing sooner than the Dutch varieties. At 1740 m. the early and summer varieties of cabbage lettuce tested headed

well. Comparison of the Dutch and Danish collections of breeders' carrot seed showed differences in the yields and in some cases even in the quality of different collections of the same variety.

The onions tested, including onions for planting, failed at altitudes above 1300 m., though in districts over 900 m., under favourable climatic conditions, even planting onions ripened completely. The varieties Kelvedon Wonder, Lincoln and Duplex gave yields above the average at 640 m. and 1150 m.

3051.

Vegetable variety trials—1950.

Progr. Rep. Pa Agric. Exp. Sta. 1951 : No. 42 : Pp. 11.

Tables are given summarizing the results of the 1950 variety trials of broccoli, egg plant, tomato, pea, Lima bean, snap bean and sweet corn, carried out at the Pennsylvania Agricultural Experiment Station. The trials of the tomato and egg plant included F_1 hybrids.

3052. WARNE, L. G. G.

Spacing experiments on vegetables. II. The effect of the thinning distance on the yields of globe beet, long beet, carrots and parsnips grown at a standard inter-row distance in Cheshire, 1948.

J. Hort. Sci. 1951 : 26 : 84–97.

Using 2 varieties of carrot, 3 varieties of beet and 1 variety of parsnip, the effects of thinning distance on yield have been investigated at Lower Withington, Cheshire. Certain varietal differences were observed, particularly in tendency towards bolting and root splitting. The need for trials at several thinning distances for each variety is emphasized, so that a regression of yield on plant density may be obtained.

3053.

Forsøg med Stammer af Gulerødder til Foderbrug 1949–1950. (Trials with strains of carrots for use as fodder, 1949–1950).

Tidsskr. Frøavl 1951 : 20 : 213–15.

Trials of 14 Danish strains of the varieties James, Lobbericher, Champion and White Belgian were tested at six Danish experimental stations on different kinds of soil. Three strains each of James: Roskilde X, Halvlange Doeinfeldt X and Lange Hinderupgaard X, and two strains each of Lobbericher and of Champion, named Daeno X and Asco X, in the case of both varieties, were declared first class and awarded the designation X after their names.

3054. OKUNO, S.

(The genetics of root colour in the radish).

Jap. J. Genet. 1943 : 19 : 99–100. [Japanese].

Root colour in *Raphanus sativus* is determined as follows: red, by the genotype $R_2r_2R_3r_3cc$; white, by $r_2r_2r_3r_3CC$; and purple, by $R_2r_2r_3r_3Cc$ or $r_2r_2R_3r_3Cc$. Plants homozygous for R_2 or R_3 do not survive.

3055. SCHÜTZ, F. VON

Die Speisezwiebel-Selektion Wädenswil. (The cooking onion Wädenswil Selection).

Schweiz. landw. Z. 1951 : 79 : 428–30.

Single plant selection in onions was started at Wädenswil in Switzerland in the early thirties, the first selections being selfed, later generations being obtained by crossing two

related plants. Keeping capacity was the main quality selected for, combined with good form and colour, regular size and thin skin. The Wädenswil selection now described combines all these qualities with high yielding ability.

3056. KEHR, A. E.
C5 Red Creole onion 'tops' for cooking, drying, storing.
 Sth. Seedsman 1951 : 14 : No. 6 : 20, 48.

Of the strains of Red Creole tested at the Louisiana Agricultural Experiment Station, C5 has proved to be superior in uniformity, yielding ability, freedom from split bulbs and early bolting, and storage qualities. The strain is being increased for commercial release. C5, like the original Red Creole, is early maturing and forms bulbs under short day conditions. C5 has two to three times the soluble solids content of most commercial varieties and is therefore especially suitable for dehydration. Lines of C5 with 23.0% or more solids content are being used in further breeding.

3057. RODRIGO, P. A.,
 GARCIA, G. G.,
 MANGABAT, G. and
 SEGGAY, L.
**A comparative study on the yields of locally produced and im-
 ported seeds of onion.**
 Philipp. J. Agric. 1949 : 14 : 349-55.

At the Philippine Experiment Stations of Ilocos Norte, Lamas and Singalong a comparative study has shown little difference between the yields obtained from locally produced and imported onion seed; it is hoped that new varieties and strains will be developed locally.

3058. FEINBRUN, N.
Chromosome counts in Palestinian *Allium* species.
 Palest. J. Bot. 1950 : J. Ser. 5 : 13-16.

The following chromosome numbers are reported: *A. stamineum*, *A. Coppolieri*, *A. chloranthum*, *A. modestum*, *A. desertorum* and *A. Artemisiatorum*, $n = 8$; *A. neapolitanum*, $n = 14$; and *A. hirsutum*, *A. Carmeli* and *A. Erdeli* var. *lasiophyllum*, $n = 7$. The last named species has a one-armed chromosome, with a proximal satellite.

3059. SZELUBSKY, R.
Caryology and morphology of some Palestinian species of *Allium*.
 Palest. J. Bot. 1950 : J. Ser. 5 : 1-12.

Chromosome numbers of $2n = 16$ and $n = 8$ have been found in *A. dumetorum*, *A. Aschersonianum* and *A. tel-avivense* (sect. *Melanocrommyum*). The somatic idiograms of the first two species are similar; that of the third species differs, lacking a satellite on chromosome C and possessing a heterobrachial chromosome A. Data on morphology, ecological characters and idiograms corroborate the distinction of *A. tel-avivense* as a separate species. The somatic idiograms of the subspecies *typicum* and *palaestinum* of *A. curtum* (sect. *Porrum*) are similar. A chromosome number of $2n = 16$ is reported for both subspecies.

3060. MACFARLANE, E. W. E.,
 MESSING, A. M. and
 RYAN, M. H.
**Effects of water source on toxicity of mercurial poisons. I.
 Standardization of procedure in tests using *Allium* roots.**
 J. Hered. 1951 : 42 : 95-99.

Treatment of *A. Cepa* root tips with solutions of the mercurial poisons phenylmercuric hydroxide and basic phenylmercuric nitrate results in c-mitotic effects at much lower

concentrations than in the case of colchicine; these effects are accompanied by chromosome stickiness and some fragmentation. The cytological reactions of the roots to treatment with the mercurial poisons are classified into four grades. The reaction of the roots to the two compounds differed according to the source of the tap water forming the culture medium and solvent; the significance of this result in the procedure of cytological experiments is discussed.

3061. SEDAR, A. W. and
WILSON, D. F.

Electron microscope studies on the normal and colchicized mitotic figures of the onion root tip (*Allium cepa*).

Biol. Bull. Wood's Hole 1951 : 100 : 107-15.

The electron microscope was used to study the structure of the spindle and the origin of the cell plate in normal mitotic root tip cells of *Allium Cepa* and in cells exposed to 2.5×10^{-4} and 2.5×10^{-3} M colchicine solutions for varying lengths of time.

During normal mitosis, fibres observed in the polar cap appear to be orientated in the long axis of the cell extending between the nuclear membrane and the outer margin of the polar cap; the latter is delimited by a membrane-like structure. Before disintegration of the nuclear membrane these fibres are entirely extranuclear. At metaphase each chromosomal fibre is composed of several smaller units arranged longitudinally. The diameter of the units varies with the fixative used. In chrome-acetic-formalin it is 500-800 Å, corresponding with the diameters of individual fibres in the polar cap, but in Flemming's fluid the fibre units are thinner. The cell plate forms at anaphase as a series of thickenings in or on the continuous fibres of the equatorial region, while the spindle becomes a network of interconnecting fibres. During telophase the cell plate assumes a more definite structure extending laterally to the cell walls on either side; meanwhile the spindle material dissolves.

One of the immediate effects of exposure to a 2.5×10^{-4} M colchicine solution for 30 minutes is the separation of fibre units. After an hour, disorientation of fibres is observed and the outlines of the chromosomes become irregular. Exposure to the same concentration for two hours results in swelling and fragmentation of the fibres, which finally dissolve. In general, the effects of short exposure to a higher concentration are comparable with those resulting from longer exposure to a more dilute solution.

3062. LEVAN, A. and
HIN TJIO, J.

Penicillin in the *Allium* test.

Hereditas, Lund 1951 : 37 : 306-24.

High concentrations of 10-20 MIU per 100 cc. sodium benzylpenicillin have severe effects on root tip cells of *A. Cepa*; nuclear changes involving pycnosis and chromosome stickiness were followed, in extreme cases, by disintegration of the entire nucleus into chromatin droplets.

The c-tumour reaction and c-mitosis were induced only by strong solutions under certain conditions; the threshold concentrations necessary for both have been determined. A low frequency of pseudochiasmata, bridges, and attached and free acentric fragments indicates that penicillin has only weak mutagenic properties.

3063. USTINOVA, E. I.

(Problems of fertilization and flowering in different species of onion).

Doklady Vsesojuz. Akad. Sel'sk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1950 : No. 10 : 16-24. [Russian].

Over thirty species of *Allium* from an extensive collection of wild and cultivated onions at the Timirjazev Agricultural Academy were studied in Moscow. A short growth period

was found to be characteristic of most species. Many species showed a capacity for the development of aerial bulbs, and the viviparous species of onion are regarded as forms in which vivipary has become fixed as a result of natural selection. Protandry occurred in *Allium* species more frequently than protogyny, which was only observed in *A. giganteum*. Most species had flowers of the entomophilous cross-pollinating type. Some species showed a capacity for selfing. In *Allium* species pollen tubes reach the ovaries only 16–18 hours and fertilization occurs only 20–24 hours after pollination. Division of the fertilized endosperm nucleus begins immediately after fertilization. Division of the zygotic nucleus occurs two days after fertilization when the cavity of the embryo sac has already become occupied with many endosperm nuclei.

3064. BARHAM, W. S. and
MUNGER, H. M.

The stability of male sterility in onions.

Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 401–09.

Experiments were carried out on the stability of male sterility in the onion, in view of unpublished reports that selfed seed had been obtained from supposedly male sterile plants. Length of photoperiod does not affect pollen development. The temperature, however, to which flower buds are exposed during the time from tetrad formation to completion of the first postmeiotic division is an important factor determining whether or not any viable pollen will be produced by a supposedly male sterile plant. At 70–80° F male sterile plants gave rise to less than 1% of apparently viable pollen. No evidence was obtained that the factors for male sterility were lost during repeated back-crossing. It has been found that at least in some of the reported cases of selfing the parent plants were heterozygous for the gene *ms* determining male sterility in association with the cytoplasmic factor *S*.

The conclusion that production of selfed seed on male sterile plants is not likely to occur often, though it may occur infrequently at high temperatures, is important from the point of view of hybrid seed production.

3065. WOODBURY, G. W.

A study of factors influencing floral initiation and seedstalk development in the onion, *Allium cepa* Linn.

Res. Bull. Idaho Agric. Exp. Sta. 1950 : No. 18 : Pp. 27.

Experiments were carried out on the influence of greenhouse temperature, storage temperature, photoperiod and length of storage period upon floral initiation and development of the seed stalk in the onions Ebenezer and Sweet Spanish, with a view to elucidating the practical problems of seed production.

3066. HÅKANSSON, A.

Parthenogenesis in *Allium*.

Bot. Notiser 1951 : No. 2 : 143–79.

Cytological and embryological investigations have been carried out on sexually reproducing forms of the species group *A. angulosum-senescens-nutans*.

Frequent parthenogenesis has been discovered in a pentaploid type of *A. nutans* and tetraploid *A. odorum* ($2n = 32$). This parthenogenesis is not restricted to the ordinary egg cell but is also shown by supernumerary egg cells with a lateral position in the embryo sac, or by antipodal cells. In pentaploid *A. nutans*, most of the egg mother cells have increased chromosome numbers, often possessing twice the somatic number. Dyad cells with the reduced number of chromosomes are formed, but as a consequence of the earlier doubling of the chromosome number the embryo sac has the somatic number. Meiosis and the development of the embryo sac were not studied in tetraploid *A. odorum*. In parthenogenetic plants of both *A. nutans* and *A. odorum*, for seed development the polar nuclei must be fertilized. In old unfertilized embryo sacs of *A. nutans* the chromosomes

of one or both synergids may become very large, resembling giant chromosomes and showing a polytene structure.

In most of the embryo sacs of *A. senescens* and *A. senescens* var. *calcareum* studied, the antipodals changed into a second egg apparatus; these forms do not however show parthenogenesis and do not produce antipodal embryos.

3067. KIDNER, A. W.
The breeding and cultivation of asparagus.
 J. R. Hort. Soc. 1951 : 76 : 134-38.

The author gives an account of his experience in pedigree breeding. The ninth generation obtained by interbreeding the continuously selected progeny of a mother crown has produced 90% of grades above the $\frac{1}{2}$ in. standard diameter. The strain now produces an additional grade, super ex selected (over 1 in.), no sprue (under $\frac{1}{4}$ in.) and only 10% of the choice grade (over $\frac{1}{4}$ in. and under $\frac{1}{16}$ in.).

3068. ATTIA, M. S. and
 MUNGER, H. M.
Self-incompatibility and the production of hybrid cabbage seed.
 Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 363-68.

In investigations at Cornell University inbred plants of cabbage were found which showed from 40 to 100% crossing when mixed pollinations were carried out. Any mating exhibiting 90% or more crossing is considered as highly self incompatible and probably satisfactory for the production of hybrid seed. In addition, it was found that the progenies derived from plants possessing high degrees of self incompatibility also had a high level of self incompatibility. Within some progenies certain matings exhibited a higher percentage of self compatibility than expected, apparently as the result of modifying factors. It is therefore recommended that many highly self incompatible inbred lines should be crossed in all combinations, including the reciprocals, prior to the selection of parental lines for the production of hybrid seed. This crossing will make possible the selection of lines that are highly self incompatible but cross compatible in both directions, and also the testing of combining ability.

An experiment was carried out to study the effect of temperature on incompatibility in a single clone. The degree of cross incompatibility was significantly lower at 60 to 70° than at 50 to 60° F, but at either temperature the line tested showed over 90% crossing. In developing inbred lines for hybrid seed production, selection should therefore be effected at temperatures as high as, or slightly higher than, those expected to prevail during the flowering period.

3069. ATTIA, M. S.
The nature of incompatibility in cabbage.
 Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 369-71.

Experiments at Cornell University have revealed that the increased fertility in self incompatible matings of the cabbage resulting from bud pollination is chiefly due to the absence or insufficient concentration of an inhibiting substance in the young styles rather than to the increased length of time given to the pollen tube for traversing the shorter, immature styles.

3070. ODLAND, M. L. and
 ISENBERG, F. M. R.
The value of asexual propagation in the production of F₁ hybrid cabbage seed.
 Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 372-76.

The feasibility of producing F₁ hybrid seed of cabbage by using self incompatible and cross compatible inbred lines is under investigation at the Pennsylvania Agricultural Experiment

Station (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 698). Methods of vegetatively propagating inbred lines have therefore been studied. In a programme of F_1 hybrid seed production, either stored heads, heads from a spring grown crop, or both can be utilized to advantage in the increase of lines by leaf cuttings. If a spring crop, grown from cuttings made from stored heads, is used for cutting material, a 400-fold vegetative increase in a single season is possible. Established cuttings from a spring crop might be planted directly in the crossing field, together with another self incompatible line. Cuttings taken from shoots that develop on seed producing plants root readily and provide a means of maintaining and increasing breeding material. Cuttings taken from vegetative plants in the greenhouse also root readily.

3071. VITTUM, M. T. and
FOSTER, R. E.
Effect of soil fertility level on the performance of eight strains of Danish Ballhead cabbage.
Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 257-60.

In tests at Barker, N.Y., no significant interaction was found between strain and level of fertility. On soil infested with *Fusarium* yellows, strains resistant to this disease significantly outyielded susceptible strains; within each of these two groups differences in yield were also noted among the strains.

3072. WORK, P.
Some new vegetables seem worthy of trial.
Sth. Seedsman 1951 : 14 : No. 4 : 34-35.

The following new vegetable varieties developed by different seed companies are recommended to growers: Bonanza cabbage; Golden Delight musk melon; Niagara, Surecrop and Sensation Hybrid cucumbers; Urbana tomato (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1943); Citation, Idagreen, Slendergreen and Tenderlong 15 snap beans; and Big Mo (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1943), F-M cross (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2002) and Golden State sweet corn (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1943).

3073. TANDON, S. L.
Colchicine-induced polyploidy in *Brassica oleracea* var. *Botrytis* L.
Sci. and Cult. 1951 : 16 : 483-84.

Colchicine-induced tetraploid cauliflowers have been obtained. The tetraploids varied considerably among themselves in the size of the head; they showed a tendency towards branching; and though meiosis was regular, fertility was reduced.

3074. GUMILEVSKIĖ, V. I.
(Growing cauliflower for seed on collective farms in the Moscow province).
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 3 : 57-61.
[Russian].

Reference is made to productive central Russian cauliflower varieties developed in recent years at the Gribovo Breeding Station. Gribovskaja Rannaja [Early Gribovo] and Moskvicka [Moskovite] were derived from Leningradskaja-Gaagskaja [Leningrad-Hague], Rannaja [Early] from Erfurtskaja [Erfurt], Skorospelka [Early Season] from Šestinedel'naja [Six Weeks], Širokolistnaja [Broad Leaf] from Perfection, and Snežinka [Snow Flake] and Kruglaja Golovka [Round Head] from Volltreffer [Bull's Eye]. These varieties develop large compact heads and yield mature seed under Moscow conditions.

3075.

Green sprouting broccoli developed in South Texas.

Sth. Seedsman 1951 : 14 : No. 6 : p. 58.

The green sprouting broccoli Texas 107 originated from a single plant selection, which was inbred for four generations and then subjected to mass selection. The variety has shown superiority in production of side sprouts and in several other characters compared with 14 other varieties and strains.

3076.

NOGUCHI, Y.

(On polyploidy in spinach).

Jap. J. Genet. 1943 : 19 : 106-08. [Japanese].

Colchicine-induced tetraploid spinach differs from the normal diploid in having the usual gigas characteristics of polyploids, a later flowering date, fewer male plants, and an increased content of ascorbic acid and provitamin A.

3077.

WHITAKER, T. W.

The genetics of leaf form in cultivated lettuce. I. The inheritance of lobing.

Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 389-94.

Data from crosses involving the lettuce varieties Oak Leaf, Paris White Cos and Imperial 615 indicate that lobing is due to a single completely dominant factor. The gene for lobing first finds full expression in the sixth true leaf in both homozygous and heterozygous plants. It is noted that in a study of crosses between commercial lettuce varieties and *Lactuca Serriola*, Durst found lobing to be dominant but interpreted his observations as indicative of two complementary factors.

3078.

NELSON, R.

Michigan State Green-Gold : a new celery resistant to *Fusarium* yellows.

Bull. Mich. Agric. Exp. Sta. 1951 : 33 : 280-85.

Early work on celery breeding for resistance to *Fusarium* yellows in Michigan is described. Recently, the variety Michigan State Green-Gold has been developed from a cross between the Downing strain of Fordhook and a tall selection of Michigan Golden. It is highly resistant to *Fusarium* yellows, has good quality and is suitable for growing in Michigan either as a summer or autumn crop.

3079.

WITTWER, S. H.,

REATH, A. N. and

DAVIS, J. F.

Pascal celery varieties in Michigan.

Bull. Mich. Agric. Exp. Sta. 1951 : 33 : 242-56.

Information is given on the performance of celery varieties of the summer and late Utah types, grown in 1950 at East Lansing, Mich.

3080.

HOARE, A. H.

The melon in England.

J. Minist. Agric. 1951 : 58 : 24-27.

Information on types and varieties of melon suitable for glasshouse cultivation in England is included.

3081.

PANGALO, K. I.

(Melons as an independent genus *Melo* Adans).

Bot. Ž. (Bot. J.), Moskva 1951 : 36 : 571-80. [Russian].

It is proposed to separate melons from the genus *Cucumis* and to reconstitute the independent genus *Melo*. A scheme of classification of the genus is given including the following

new species: *Melo Adzhur*, *M. Cassaba*, *M. Adana*, *M. ambiguus*, *M. Chandalak*, *M. Ameri*, *M. Zard*, *M. Figari*, *M. chinensis*, *M. Conomon* and *M. monoclinus*, the last three belonging to a new section *Melonoides*.

3082. BEATTIE, J. H. and
DOOLITTLE, S. P.

Muskmelons.

Fmrs' Bull. US Dep. Agric. 1951 : No. 1468 : Pp. 38.

Descriptions of the varieties and strains suitable for the different regions of the United States are included. Information on varietal resistance to several diseases is also provided.

3083. CRITTENDEN, H. W.

Root-knot nematode control on cantaloupes.

Phytopathology 1951 : 41 : p. 560. (Abst.).

Under conditions of severe nematode infection at Delaware, Hale's Best produced higher yields than Schoon's Hardshell although the development of root knot was similar on both varieties.

3084. BEATTIE, J. H. and
DOOLITTLE, S. P.

Watermelons.

Fmrs' Bull. U.S. Dep. Agric. 1951 : No. 1394 : Pp. 30.

Notes on the water melon varieties most suitable for growing in the United States are included.

3085. YADLIN, E. V.

Tres nuevas variedades de hortalizas para Chile. (**Three new horticultural varieties for Chile**).

Agric. Téc., Chile 1950 : 10 : 43-53.

The new water melon variety Chilena 7 [Chilean 7] is a selection of local material made on the basis of improved yield and quality of the fruit.

The red pepper Cristal 6 is an improved selection of Crystal with large fleshy fruits, while the sweet pepper Nora de Murcia 16 was selected from Nora de Murcia, and shows improvement in fruit colour and mildness of flavour.

- 3086.

Fusarium wilt of watermelons.

Agric. Gaz. N.S.W. 1951 : 62 : 200-01.

The *Fusarium* wilt resistant varieties Blacklee and Hawkesbury Wilt Resistant are recommended to growers in New South Wales.

3087. WEILING, F.

Artkreuzungen beim Kürbis. (**Species crosses in pumpkins**).

Naturwissenschaften 1951 : 38 : p. 262.

As a result of 396 crosses made in 1949 and 1950, 57 hybrid fruits were obtained from different combinations of *Cucurbita maxima*, *C. Pepo* and *C. ficifolia*. The set varied from 0 in *C. Pepo* x *C. ficifolia* to 37.8% in *C. maxima* x *C. Pepo*. All crosses with *C. Pepo* or *C. ficifolia* as seed parent gave lower sets than the reciprocals, but varied with the particular race used.

Embryo formation was conditioned by 7 or more genes and occurred only when at least one dominant allele of each pair was present. Various growth irregularities were also observed and the results are taken to prove the existence of interspecific barriers between the species concerned.

3088. WHITAKER, T. W.
A species cross in *Cucurbita*.
 J. Hered. 1951 : 42 : 65-68.

C. Andreana crossed readily with *C. maxima* in both directions, the F_1 and succeeding generations being fully fertile. From its breeding behaviour *C. Andreana* seems to be more closely related to the perennial species *C. ficifolia* than to the annual species, with the exception of *C. maxima*. The data show that dominant characters are present in the wild species, *C. Andreana*, and the domesticated species, *C. maxima*, in approximately equal numbers; the evidence suggests that in most cases each of the characters studied depends upon a single pair of major genes; modifiers may also condition some characters. Introgression between the two species has probably occurred since historic times in Argentina, Uruguay and Bolivia. Two alternative suggestions concerning the origin of the two species are put forward: either *C. maxima* was derived from *C. Andreana* by selection, or *C. Andreana* arose as a nonhorticultural form of *C. maxima*.

3089. LUTOHIN, S. N.
(Vegetative rapprochement between annual plants of different families).
 Priroda (Nature) 1950 : No. 10 : 57-58.

In experiments at the Dnepropetrovsk Breeding Station for Vegetables an improved grafting technique was developed which results in 60% successful grafts between plants of different families. The method consists of temporary rapprochement between the vegetative organs of plants left on their own roots and of severing one of the grafted components from its own roots after the graft has taken. Grafts obtained in this manner included normally developing hybrids between *Amaranthus albus* and *Chenopodium album*, *Ch. album* and *Cucurbita Pepo*, and *A. albus* and *Citrullus colocynthoides*. The use of the method of vegetative rapprochement is recommended in breeding economic plants for the desirable characters of wild plants.

3090. EDELJŠTEĬN, V. I.
(The biology of vegetables).
 Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 2 : 51-56.
 [Russian].

Mention is made of the Soviet cucumber varieties Astrahanskii [Astrahanj], Margelanskii and Galahovskii [Galahov] which are resistant to drought and of the variety Daljne-vostochnyi [Far Eastern] resistant to high air humidity.

3091. BARNES, W. C. and
 EPPS, W. M.
Some factors related to the expression of resistance of cucumbers to downy mildew.
 Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 377-80.

The effects of physiological age, abundance of inoculum, weather conditions and fungicides upon the expression of resistance to *Peronoplasmopara cubensis* in cucumber varieties are described, as a result of observations made during breeding work at the Clemson College Truck Experiment Station, Charleston, S.C.

3092. EDELJŠTEĬN, V. I.
(The problem of an uninterrupted flow of vegetables all the year round).
 Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 1 : 46-52.
 [Russian].

Indoor trials of cucumbers, tomatoes and lettuce at the Vegetable Research Station of the Timirjazev Agricultural Academy are mentioned.

The most productive lettuce variety was Moskovskii Parnikovyĭ [Moscow Hot Frame] which yielded 4 kg. early heads per frame.

The Klinskiĭ cucumber, originating from seed grown at the Vegetable Research Station, gave twice the amount of early fruits and was nearly twice as productive as Klinskiĭ grown from seed from elsewhere in the USSR.

The tomato varieties Puškinskiĭ [Puškin], Nabar, a variety developed at the Azerbaïdžan Breeding Station, and Bison 639, a variety bred at the Gribovo Breeding Station, proved 2-3 weeks earlier than Lučšii iz Vseh [Best of All], Budennovka [Budennyĭ] and other varieties.

3093.

Tomato field day. Scoresby Research Station.

J. Dep. Agric. Vict. 1951 : 49 : 203-05.

Tomato breeding at the Scoresby Horticultural Research Station, Victoria, has as its aims the production of (1) dwarf varieties suitable for processing and canning, and (2) for the southern districts, staking varieties which are resistant to disease and can be artificially ripened. Promising material developed includes: a selection of Rey de los Tempranos [King of the Earlies], a variety reputed to be spotted wilt resistant; KY-1, a dwarf variety with smooth fruit, suitable for growing in the Goulburn Valley as a canning type; JM-1, a selection of Potentate, for late marketing and artificial ripening; Scoresby Bella Secca, a dwarf variety for industrial purposes; Scoresby Orange, a selection of Orange Prolific, promising as a main crop tomato in southern districts; and Scoresby Home Garden, a variety showing superiority over Grosse Lisse for domestic cultivation.

3094. BUTLER, L.

New linkage groups in the tomato. New data necessitate revision of the fifth, tenth, eleventh and twelfth linkage groups.

J. Hered. 1951 : 42 : 100-04.

The need for standardized nomenclature for genes in the tomato is emphasized and the symbols used by Young and MacArthur (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 570) are regarded as satisfactory, except in a few cases. New symbols are proposed for d_1 , d_2 , a_1 , a_2 , u_1 and u_2 , since the symbols with different subscripts might be thought to refer to multiple alleles when in fact they represent genes in different linkage groups. Genetical analysis has shown that the linkage group 10 proposed by MacArthur (cf. *Plant Breeding Abstracts*, Vol. V, Abst. 38) is not valid and should be combined with linkage group 5. The latter group has been approximately mapped and consists of the following genes: $F-A-Lf-J-Cf_{p2}-Wt-Nt$. Two new genes, b for broad leaf, and mc for macrocalyx, act as markers in linkage groups 11 and 12 respectively. Preliminary data suggest that nc for narrow cotyledon will serve as a marker gene for a newly constituted group 10; this gene appears to be independent of all known groups but further data are required to eliminate the possibility of loose linkage in two cases.

3095. ALPATJEV, A. V.

(A new tomato variety, Štambovyĭ Karlik 01185).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 3 : 61-62.
[Russian].

A new tomato, Štambovyĭ Karlik 01185 [Determinate Dwarf 01185] was bred at the Gribovo Breeding Station from Gribovskii Štambovyĭ 1154 [Gribovo Determinate 1154] x Bison 0639. The last named variety is early in maturity. Gribovskii Štambovyĭ 1154 originated from a cross between Želtyĭ Mičurinskii [Mičurin's Yellow] x Bison. The new variety is several days earlier than Bison and Štambovyĭ Alpatjeva [Alpatjev's Determinate].

The plants are upright and 35 to 45 cm. tall. The variety is remarkable for its good fruit setting capacity, which accounts for a regular yield even in a bad season. Under the

conditions of the Non-Black-Earth Belt, without irrigation, the yields are between 500 and 600 c. per ha. The fruits are red, round and smooth, weigh 60 to 80 grm., keep well and have a good flavour. In 1950 the variety was made a standard in several provinces of the central and northern RSFSR.

3096. PORTE, W. S.

Tomato hybrids between fertile lines without flower emasculation.

Seed World 1951 : 68 : No. 3 : 18, 21, 46-47.

In experiments at the Plant Industry Station, Beltsville, Md., a completely fertile inbred line, possessing the simple recessive characters dwarf habit and potato leaf, was used to determine the percentage of F_1 hybrid seed produced by cross pollination without emasculation. The pollen parents were Pan America and Rutgers, which have indeterminate growth habit and the usual type of leaf. The tests revealed that 90 to 95% of hybrid seed may be expected as a result of cross pollination between fertile parents, provided that cross pollination is performed when the flowers are one-quarter to three-quarters open, and that all fully open flowers at the time of pollination are destroyed. Elimination of emasculation should considerably decrease the cost of producing F_1 hybrid seed since the labour is reduced; it should also result in an increase in the amount of seed obtained since unemasculated flowers usually yield more seed than emasculated ones.

3097. HELM, J.

Vergleichende Betrachtungen über die Entwicklung der Infloreszenz bei *Lycopersicum esculentum* Mill. und bei einer Röntgenmutante. (**Comparative observations on the development of the inflorescence in *L. esculentum* Mill. and an X-ray mutant**).

Züchter 1951 : 21 : 89-95.

The anantha mutant investigated was obtained from X-irradiated seed of the tomato variety Condine Red.

Study of the phases I and II which result in the formation of the dichasia and scorpioid cymes respectively, in the normal tomato plant and the mutant anantha showed that in the latter case not only is phase I of longer duration than in the normal plant but also the number of branchings is greater, with a concomitant absence of primordia and of development of centrally situated flowers in the dichasia. Again in the mutant, phase II, which normally leads to the development of the individual flowers, is limited as regards duration and the number of scorpioid cymes produced. No primordia or differentiation of flowers is found. Alteration of the balance between the two phases causes enlargement of the whole inflorescence owing to the multiplicity of inflorescence axes and complete absence of primordia and flower development, so that the plant is sterile.

3098. FADDEVA, T. S.

(The induction of changes in dominance of tomato hybrids by grafting).

Bot. Ž. (Bot. J.), Moskva 1951 : 36 : 561-70. [Russian].

Grafting experiments with tomatoes grown from seed of a single fruit of the hybrid Krasnaja Višnja [Red Cherry] x Earliana are reported. The evidence showed that the F_2 families of grafts on Earliana and on Krasnaja Višnja x Earliana stocks developed fruit characters which are normally recessive. Hybrids on their own roots or grafted on Krasnaja Višnja gave progenies with the dominant characters of the Krasnaja Višnja type. The grafting operation itself is regarded as a sufficiently drastic interference in the development of the plant to make the hybrids capable of developing characters which under normal conditions are recessive.

The study of the grafting techniques showed that the most profound changes in scions occur when young shoots are grafted into the cortex, pith or a wound callus.

3099. GLUŠČENKO, I. E.

(The hybridization of plants by grafting).

Uspehi Sovremennoi Biologii (Advances in Modern Biology) 1950 : 30 : 15-48.

Experimental data on hybridizing tomatoes by grafting, including some evidence which has been already reviewed (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 548 and 549 and Vol. XIX, p. 667-68), are given. In recent years the methods of grafting have been improved. These give a higher percentage of successful grafts and result in more thorough changes in the grafted material. The most recent experiments include trials of sexual progenies of various vegetative hybrids involving Humbert as a scion variety and studies of inheritance in several vegetative hybrids.

The trials of the vegetative hybrids of Humbert showed that differences exist between Humbert and the vegetative hybrids and also between the various seed generations of the hybrids themselves regarding most characters, including their yielding capacity. The Humbert controls were the least productive. The F_8 of Humbert on *Solanum nigrum* produced the highest yield, the other hybrids coming in the following order: the F_2 of Humbert on Ficarazzi, the F_2 of Humbert on *Lycopersicon pimpinellifolium* and the F_4 of Humbert on Ficarazzi. The F_2 and F_3 of the sexual hybrids Humbert x Ficarazzi were intermediate in respect of their yielding capacity and the F_4 sexual hybrids were the least productive. The hybrids remarkable for high yielding capacity also produced larger fruits. The largest fruits were produced by Humbert grafted on the small fruited *S. nigrum*.

The vegetative hybrids of Humbert on *S. nigrum*, *L. pimpinellifolium* and Ficarazzi produced more mature fruits than ungrafted Humbert plants. The variability in the number of locules in the above material is discussed. The inheritance of colour in various vegetative hybrids was studied. The yellow fruited form of the vegetative hybrid Zolotaja Koroleva [Golden Queen] and the red fruited form of the grafted hybrid Zolotaja Koroleva on Ficarazzi produced plants with yellow and raspberry coloured fruits, besides the red fruited forms. Crosses between Ficarazzi and grafted hybrids with red fruits gave mostly plants with red fruits, some with raspberry coloured fruits and none having yellow fruits. The control crosses of pure varieties gave dominance of red over yellow in the F_1 . The F_2 produced mostly red fruited and some yellow fruited forms, but no plants having yellow-red or raspberry coloured fruits. The inheritance of colour was also studied in the following crosses between several forms of the vegetative hybrid, Zolotaja Koroleva on Ficarazzi having differently coloured fruits: yellow x yellow, yellow x red, yellow x raspberry coloured; yellow-red x yellow-red, yellow-red x raspberry coloured, yellow-red x red; red x raspberry coloured, and raspberry coloured x raspberry coloured, raspberry coloured x yellow, raspberry coloured x yellow-red, and raspberry coloured x red. The results, which are tabulated, showed that the crosses involving a yellow fruited form or one with yellow-red fruits as female parent gave F_1 plants with red and raspberry coloured fruits, but no plants with yellow or yellow-red fruits.

The results of a study of colour inheritance in the sexual hybrids between the F_2 vegetative hybrid Golden on Meksikanskii 353 [Mexican 353] and Golden, and between the F_2 Golden on Meksikanskii 353 and Meksikanskii 353 support the earlier evidence that segregation occurs in the vegetative hybrid in the F_1 . The sexual hybrids of Golden x Meksikanskii gave an F_1 having red fruits and an F_2 having both yellow and red fruits. Hybridization of the vegetative hybrid Golden on Meksikanskii 353 involving crosses between yellow forms x yellow, yellow x orange, yellow x red, red x red, red x yellow, red x orange, orange x orange, orange x yellow and orange x red gave analogous results to those obtained in experiments with the vegetative hybrid Zolotaja Koroleva on Ficarazzi. The character of orange fruit colour proved recessive not only in respect of red but also of yellow fruit colour.

A vegetative hybrid obtained recently by grafting germinating seed of Mikado on Zolotaja Koroleva stocks gave, in the first seed generation, plants with leaves characteristic of Mikado and plants with the dissected leaves of the type of Zolotaja Koroleva. The fruits of all plants were red, as in Mikado. In the second generation all plants again segregated

in respect of the leaf character. All fruits were red. The sexual hybrids between these varieties gave an F_1 with red fruits and dissected leaves and an F_2 which produced red and yellow fruits and had dissected leaves and leaves of the Mikado type.

3100. CARLSSON, G.
En undersökning om tetraploida tomaters odlingsvärde. (**An investigation on the extent to which tetraploid tomatoes are worth growing**).

Medd. Gullåkers VäxtförädlAnst, Hammenhög 1945 : No. 45 : 41-43.

Having briefly enumerated some of the features of haploid, diploid, triploid and tetraploid tomatoes, the writer describes some comparisons of tetraploid and diploid lines of the variety Potentat [Potentate], at Gullåker Plant Breeding Station, Sweden, in 1943 and 1944. The diploids proved superior in yield and quality in both years, but possibly crosses between tetraploids might give better results. The tetraploids were distinguishable at the seedling stage from diploids.

3101. BIANCHI, A.
Alcuni risultati in tentativi di produzione per decapitazione di pomodori poliploidi. (**Some results in attempts to produce polyploid tomatoes by decapitation**).

Genetica Agraria, Roma 1950 : 2 : 258-75.

The following differences were recorded on comparing a polyploid branch induced on a tomato plant by decapitation with a normal branch at the same stage of development. In the polyploid, the leaves were twice as heavy, thicker and greener and had fewer lobes and larger stomata; the flowers were larger, fell more readily and produced little pollen, while the fruits were below normal in size and contained only 20% of seeds, which were larger and heavier but inferior in germination capacity. The concentration of β carotene, lycopene and lutein respectively was approximately twice as high in the polyploid truss.

3102. MARX, T.
L-Ascorbinsäure und Tomaten. (**L-ascorbic acid and tomatoes**).
Landw. Forsch. 1950 : 2 : 74-80.

Ascorbic acid determinations on some 20 tomato varieties showed the content to vary between 20 and 25 mg. %. No significant differences between the varieties were observed but there were indications that the ascorbic acid content could be raised by selection.

3103. IVANOVSKAJA, T. L.
(**The effect of 2, 4-dichlorophenoxyacetic acid upon tomatoes**).
Trudy Inst. Genetiki (Proc. Inst. Genetics) 1950 : No. 17 : 129-56.
[Russian].

The effects of the chemical upon tomatoes and other economic plants, including sugar beet and tobacco, were studied. The treatments sometimes resulted in morphological changes. Different varieties of tomatoes and individuals within a variety showed varied degrees of response. This depended on their health, age and environment and the concentration of the chemical. Albino was the most sensitive variety and Kartoffelnolistnyĭ Melkoplodnyĭ [Small-fruited Potato Leaf] the least susceptible.

Morphological changes were transmitted experimentally to healthy material by grafting or by infecting the leaves with cell sap extracted from the tobacco and tomato plants treated with the chemical. No evidence was obtained that the changes induced in the tomato leaves were heritable, since most fruits were seedless.

3104. AĬZENŠTAT, J. A. S.
(Changes in dominance resulting from curtailment of illumination).
 Dokl. Akad. Nauk SSSR (Rep. USSR Acad. Sci.) 1950 : 70 : 97-100.
 [Russian].

The effects of short day upon the tomatoes King Humbert, Break o' Day, Slivovidnyi [Plum], Persikovidnyi [Peach], Plannovyĭ [Plan] and Bison and hybrids between some of these varieties were studied at the Maikop Branch Research Station of the USSR Institute of Plant Industry. The experimental plants were illuminated for nine hours and seven hours respectively each day, while the controls were grown under natural day light. It was found that training the plants under seven hour photoperiods had the effect of reducing their vitality, especially their capacity to pass on their characteristics to their progenies. Training the plants for a long period under conditions of very short day is regarded as an efficacious method of directing dominance.

3105. LARSON, R. E.
A comparison of combining abilities of a monorecessive male-sterile Earliana mutant and a normal Earliana tomato.
 Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 358-62.

In crosses with three tester varieties, male fertile (*MsMs*) and male sterile (*msms*) lines of Earliana exhibited no differences in combining ability, as indicated by early marketable yield, total yield and fruit size. It is suggested that the male sterile forms of Earliana could be used immediately in the commercial production of F_1 hybrid seed.

3106. SAYRE, C. B.,
 PEW, W. D. and
 PATTERSON, M. E.
Comparative yields of 5 varieties of tomatoes harvested at mature green and at red-ripe maturity.
 Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 337-42.

In an experiment at the New York State Agricultural Experiment Station all five varieties studied gave heavier fruit yields when harvested at the green mature stage than when picked at red ripe maturity for canning. The individual fruits weighed less when green and caused less strain on the plants, with the result that larger numbers of marketable fruits per plant and larger total yields were secured. The recently introduced varieties Gem, Red Jacket and Longred (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 18) compared favourably in both green and red ripe yields with the former leading commercial variety in New York State, John Baer. Both John Baer and Rutgers possess the gene for green shoulder; the stem end of their fruits is a darker green than the blossom end. As the fruits of these varieties reach the stage of green maturity the colour distinctly fades, especially at the blossom end. In varieties with the gene for uniform fruit colour, it is more difficult to judge the right time for picking the fruits for green wrapping; maturity in such varieties must be judged by size and firmness.

3107. HALSEY, L. H. and
 JAMISON, F. S.
Yields of tomato varieties harvested at two stages of maturity from staked and unstaked plants.
 Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 332-36.

In experiments at the Florida Agricultural Experiment Station, it was found that although the total yield per acre from staked and pruned plants was significantly greater than from unstaked and unpruned plants, the difference in yield of fruit of marketable quality was not significant, because of the greater loss through cracking of the fruit from the staked

plants. The total yields from the harvestings of green mature fruit and fruit turning to pink were similar. A longer yield of marketable fruit was however obtained from the harvesting at the green mature stage; fruits harvested pink were much more affected by cracking. The varieties differed in both total yields and yields of marketable fruits; they also differed in response to the various treatments.

3108. ŠOMOŠ [SOMOS], A.

(New agricultural methods help the progress of our vegetable growing).

Acta Agron. Acad. Sci. Hungar. 1950 : 1 : 5-57. [Russian].

Methods for more economical cultivation of tomatoes were studied in Hungary. Outdoor cultivation in clusters by the Lysenko method showed some promise. The results of biochemical analyses and varietal trials are reported. The late variety President Harfield produced the highest yield of all commercial varieties tried. Delikatesse and Datskii Eksport [Danish Export] were the most productive early varieties. Other varieties which gave a good account of themselves were 37, Turulj, from Datskii Eksport x President Harfield, and Bonny Best.

3109. JACYNINA, K. N.

(Tomato varieties resistant to stem rot).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 1 : 57-58.

[Russian].

Breeding tomatoes for resistance to bacterial stem rot at the Verhne-Havskaja Vegetable Breeding Station is reported. Infection trials showed that no variety was immune from the disease, but Marglobe, Heinrich Heine and Budennovka [Budennyi] were less susceptible to it than other varieties. John Baer was more susceptible to stem rot in some years than in others.

The Smorodinovidnyi [Red Currant] tomato showed a high degree of resistance to stem rot. Tests of 26 hybrids between Smorodinovidnyi and cultivated varieties showed that they were all susceptible to some extent, but some individuals developed well and yielded a good crop despite heavy infection.

As a result of threefold selection under conditions of artificial infection, two highly resistant hybrids were obtained, K 9 from Danish Export x Smorodinovidnyi and K 1 from Lucullus x Smorodinovidnyi. Both hybrids were high yielding and early but had small fruits of unsatisfactory flavour. To improve their fruit size and fruit quality the hybrids were back-crossed to cultivated varieties. Selection of the back-crosses under conditions of artificial infection gave promising material from which two varieties have already been selected.

The first, Rakoustoičivyi Skorospelyi 12 [Early Stem Rot Resistant 12], from (Danish Export x Smorodinovidnyi) x Heinrich Heine, reaches maturity 90-100 days after planting. The fruits weigh 70-90 gm. and are arranged in bunches of 5 or 6. The fruits are smooth and flattened and their flavour is good. The variety outyielded Bison. Rakoustoičivyi Krupnoplodnyi 69 [Large Fruited Stem Rot Resistant 69], from (Lucullus x Smorodinovidnyi) x Birjučekutskii 20 [Birjucii Kut 20], is a mid-season variety reaching maturity in 100-115 days. The plant is vigorous and has a semiprostrate habit. The fruits grow in bunches of 5-7. They are large, fleshy, smooth, round and slightly ribbed, and their flavour is good. The variety has a high yielding capacity.

3110. GERDEMANN, J. W. and

FINLEY, A. M.

The pathogenicity of races 1 and 2 of *Fusarium oxysporum* f. *lycopersici*.

Phytopathology 1951 : 41 : 238-44.

From inoculations of three tomato varieties, Bonny Best, S-39 (a third back cross hybrid of *Lycopersicon esculentum* x *L. pimpinellifolium*) and *L. pimpinellifolium*, with isolates of

F. oxysporum f. *Lycopersici* obtained from several different areas, further evidence has been obtained at Columbia, Mo., of the existence of two distinct races of the pathogen. Race 1 is described as nonpathogenic to plants possessing the *L. pimpinellifolium* factor for resistance; isolates which are pathogenic to plants with the *L. pimpinellifolium* resistance factor, as well as to those without, are known as race 2. Tests of single spore isolates have shown distinct qualitative differences in pathogenicity; no intermediate forms, representing transitional types, have yet been found. Therefore, it seems probable that race 2 is a mutant form of race 1, arising in field plots of resistant plants known to be infected with race 1.

3111.

New yellow tomato developed in Texas.

Crops and Soils 1951 : 3 : No. 7 : p. 31.

Golden Sphere, a new yellow-fruited tomato developed by the Tomato Disease Investigations Laboratory, Jacksonville, Tex., from a cross between Pan America and a yellow-fruited selection from Tucker, is resistant to *Fusarium* wilt.

3112.

DENNETT, R. K.

The association of resistance to fusarium wilt and stemphylium leaf spot in tomato, *Lycopersicon esculentum*.

Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 353-57.

At the Hawaii Agricultural Experiment Station data obtained from back cross populations of complex origin have revealed a linkage relationship between the gene *I* for resistance to *Fusarium* wilt and the gene *Sm* for resistance to *S. Solani*, with a cross over value of 36.69 ± 1.40 . *Lycopersicon pimpinellifolium* formed the source of resistance to *Fusarium*.

3113.

KEVORKIAN, A. G.

The "white mold" disease of tomatoes in Cuba.

Phytopathology 1951 : 41 : p. 563. (Abst.).

The tomato breeding programme at Cienfuegos has been interrupted by an outbreak of white mould (*Eriophyes cladophthirus*) from which none of the 12 varieties and 15 hybrids tested was immune.

3114.

SMITH, P. G. and

GARDNER, M. W.

Resistance in tomato to the spotted-wilt virus.

Phytopathology 1951 : 41 : 257-60.

The results of experiments in California during the past 12 years to determine the nature of resistance to the spotted wilt tomato virus have shown that the high degree of resistance in the variety Red Currant and the moderate resistance of German Sugar are apparently due to multiple factors, as all hybrids with standard commercial varieties have had intermediate levels of resistance in the F_1 and F_2 generations. Back crosses made to the susceptible parents in all crosses have resulted in loss of resistance. Attempts to increase the degree of resistance by crossing German Sugar and Red Currant have also been unsuccessful.

3115.

ÅKESSON, H.

Tre års försök med tomatsorten Carrick. (Three years of trials of the tomato variety Carrick).

Medd. Gullåkers VäxtförädlAnst., Hammenhög 1945 : No. 2 : 23-27.

In comparative trials, begun in 1941 at Gullåker Plant Breeding Institute, Sweden, the tomato Carrick proved superior in yield and in the number of first class fruits, in spite of showing the highest number of ribbed fruits. It was also earlier than the other varieties tested. One variety, ESI, was practically free from ribbed fruits.

3116. PLOPER, J.

Una variedad interesante de tomate: la "Pearl Harbour". (Pearl Harbour, an interesting variety of tomato).

Circ. Estac. Exp., Tucumán 1949 : No. 142 : Pp. 4.

Comparative figures are given for the vegetative period and yield of standard Argentine tomatoes and Pearl Harbour, of interest on account of its earliness and ability to grow without support.

3117. TATEBE, T.

(Studies on the inheritance of fruit shape in the egg plant).

Jap. J. Genet. 1943 : 19 : 57-64. [Japanese].

In crosses between round and long fruited egg plants, the F_1 bears fruits approximating to the geometrical mean of the fruits of the two parents, while in the F_2 a range of fruit shapes occurs, following a positively skewed curve about the same mean as in the F_1 . At least three partially dominant genes are believed to control fruit shape, and it is believed that length and width may be controlled by different factors.

3118. TATEBE, T.

[Studies on the inheritance of colour in the egg plant (continued)].

Jap. J. Genet. 1944 : 20 : 1-7. [Japanese].

The F_1 of the cross Aoshima [Green-striped] (green variegated fruit) x Oserikawa (purple fruit) bears purple fruit. In the cross, Aoshima x Bukoshiro (white fruit), green variegation of the fruit is dominant. When Aoshima is crossed with Kantoao [Kanto Green] (green fruit), green variegation is again dominant, but in the cross Aoshima x Aonasu [Green Egg Plant] (green fruit) the F_2 segregation is as follows: 36 purple fruit and purple corolla: 9 green variegated fruit and purple corolla: 12 green variegated fruit and white corolla: 3 green fruit and purple corolla: 4 green fruit and white corolla.

On the basis of these results the genotype of Aoshima is thought to be $CCPPdd GGG_vG_v$, C , P and D being complementary genes for purple pigmentation, G the gene for green fruit, and G_v a newly postulated gene for green variegation.

3119.

Beans.

Bull. Minist. Agric., Lond. 1950 : No. 87 : Pp. 35.

This bulletin on bean cultivation in Britain includes information on the following: types and varieties of broad, French and runner beans; the kinds and varieties suitable for canning and dry harvesting; and French bean varieties used for cultivation under glass.

3120. THOMAS, H. R.

A strain of alfalfa mosaic virus causing a systemic mottle in beans

Phytopathology 1951 : 41 : p. 566. (Abst.).

A systemic mottle has been caused on beans by artificial inoculation with a yellow dot virus isolated from beans in Washington and lucerne in Idaho; although 45 commercially grown varieties were inoculated, none showed resistance. The pathogen may be a strain of lucerne mosaic virus.

3121. KIHLMAN, B. and

LEVAN, A.

Localized chromosome breakage in *Vicia faba*.

Hereditas, Lund 1951 : 37 : 382-88.

A high frequency of chromosomal fragmentation was induced in root tip cells of *V. faba* by treatment with 8-ethoxycaffeine and 1.3.7.9-tetramethyluric acid. Breakages were

predominantly at the attachment thread of the satellite in the m chromosomes after treatment with 8-ethoxycaffeine; structural changes were less regularly associated with the m chromosomes after treatment with the other purine derivative.

3122. CERUTI, A.
Il metabolismo dell'acido nucleinico durante la maturazione dei semi di *Phaseolus vulgaris*. (**Nucleic acid metabolism during the maturation of the seeds of *Ph. vulgaris***).
Nuovo G. Bot. Ital. 1947 : 54 : 786-89.

During maturation, nucleic acid has been demonstrated by staining reaction to pass from the nucleus into the cytoplasm.

3123. GUYER, R. B.,
KRAMER, A. and
IDE, L. E.
Factors affecting yield and quality measurements of raw and canned green and wax beans—a preliminary report.
Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 303-14.

A study was made of the correlations between objective and organoleptic evaluations of factors involved in the quality of raw and canned beans, using samples of the snap bean varieties Stringless Green Pod and Pencil Pod Black Wax, harvested at five dates and four frequencies. The following determinations were made on all the raw and some of the canned and frozen samples: seed percentage; pressure fibre recordings; fibre content by the official method of the Food and Drug Administration; fibre content by the blender method; moisture percentage; ascorbic acid content; concentration of green and yellow pigments; and organoleptic ratings of maturity, fibrousness and colour. Varietal differences were noted in some of the factors studied.

3124. BROCK, R. D.
Resistance to angular leaf spot among varieties of beans.
J. Aust. Inst. Agric. Sci. 1951 : 17 : 25-30.

In New South Wales 164 types of *Phaseolus* were inoculated with a culture of *Isariopsis griseola*, developed from isolates found in different localities within the state. Varieties are arranged in groups according to the degree of susceptibility, measured by the number of lesions, percentage necrosis and amount of defoliation. Although none was immune, several varieties of *Ph. vulgaris* and one of *Ph. multiflorus* had a high degree of resistance. The possibility of developing a dwarf variety with combined resistance to *I. griseola*, *Pseudomonas phaseolicola*, *Colletotrichum Lindemuthianum* and *Heterodera marioni* is mentioned.

3125.
Service to the vegetable industry.
Agric. Gas. N.S.W. 1951 : 62 : 171-72.

The breeding work of the New South Wales Department of Agriculture is illustrated by reference to the development of beans with resistance to blight and anthracnose.

3126. ZAUMEYER, W. J. and
FISHER, H. H.
Potentialities of southern bean mosaic in the field.
Phytopathology 1951 : 41 : p. 567. (Abst.).

The results of field inoculations of 68 varieties and strains of snap bean during 1950 are reported from the USA; only six varieties remained healthy.

3127. CASSERES, E. H. and
THOMPSON, H. C.

Snap bean variety tests at Turrialba, Costa Rica.

Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 349-52.

- CASSERES, E. H. and
THOMPSON, H. C.

Pruebas de variedades de vainicas en Turrialba, Costa Rica. (Snap bean variety tests at Turrialba, Costa Rica).

Turrialba 1951 : 1 : 144-46.

Tests of the yielding capacity of six snap bean varieties grown under conditions of low or high rainfall were carried out at the Inter-American Institute of Agricultural Sciences. The local variety Jamaica was significantly superior in yield. The results indicated, however, that fairly good crops from varieties with better quality than Jamaica can be produced under the tropical conditions at Turrialba. The interaction between variety and planting date was highly significant.

3128. KELLY, E.

New method of preparing Lima beans for frozen food locker.

Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1951 : 13 : 195-98.

A method of preheating or blanching Lima beans in the pod, prior to refrigeration, is described. The varieties Henderson Bush, Triumph, Thorogreen and Baby Potato Bush were used in studying the method, which is suitable for domestic use but should not be applied in the case of strongly flavoured or slightly bitter varieties.

3129. BURLEY, R. H.

Hot weather Lima—the Bixby.

Sth. Seedsman 1951 : 14 : No. 5 : 32, 40.

Bixby, a new bush type of Lima bean obtained from Henderson x Fordhook, is to be released by the Oklahoma Agricultural Experiment Station. It has a well developed root system and consequently thrives in hot dry conditions; it also shows a high degree of nematode tolerance. Bixby matures several days later than Henderson and gives superior yields of slightly plumper beans.

3130. THOMAS, H. R.,
JORGENSEN, H.,
FISHER, H. H. and
WESTER, R. E.

Resistance to downy mildew in Lima beans.

Phytopathology 1951 : 41 : 566-67. (Abst.).

Resistance to *Phytophthora Phaseoli* has been discovered in the following varieties: PEI 164155 from India; PEI 163580 from Guatemala; a selection from southeastern USA; line L 37 from California; and a wild Lima bean from Mexico. The occurrence of slight sporulation on these resistant lines under severe epidemic conditions within a greenhouse indicates that a hypersensitive type of resistance is involved. Various crosses have been carried out; from an analysis of the progeny it appears that resistance is determined by a single dominant gene.

3131. WESTER, R. E.

A comparison of greenhouse and field methods for evaluating lima beans for resistance to root knot nematodes.

Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 395-400.

A greenhouse method of testing Lima bean varieties and selections for nematode resistance is described which is much more rapid and severe than field tests.

3132. THOMAS, H. R.,
ZAUMEYER, W. J. and
JORGENSEN, H.
Inheritance of resistance to Lima-bean mosaic virus in the Lima bean.
Phytopathology 1951 : 41 : 231-34.

At Beltsville, Md., reciprocal crosses between Fordhook (resistant) and Sieva (susceptible) Lima beans produced resistant F_1 generations. Segregation of 9 resistant: 7 susceptible was obtained in the F_2 and these results were substantiated in the F_3 generation. The varieties Triumph (susceptible) and Peerless (resistant), which are selections from a cross between Fordhook and Sieva, were also crossed reciprocally and similar segregation results were obtained. It appears that resistance to infection with the Lima bean mosaic virus is controlled by two dominant complementary factors in the Fordhook and Peerless varieties.

3133. **Progress for Blackeyes. Extra Early Blackeye pea available for increase.**
Sth. Seedsman 1951 : 14 : No. 6 : p. 51.

The cowpea Extra Early Blackeye is being reintroduced in Texas, since in yield trials it has without exception matured earlier than any other variety and has usually produced the highest yields.

3134. **Progress for Blackeyes. Purple Hull No. 49 seed now being released.**
Sth. Seedsman 1951 : 14 : No. 6 : p. 51.

The new early maturing cowpea Purple Hull 49, selected from a cross between Extra Early Blackeye and a strain of Purple Hull, is being released by the Texas Agricultural Experiment Station.

3135. BRITTINGHAM, W. H.
The inheritance of date of pod maturity, pod length, seed shape and seed size in the southern pea *Vigna sinensis*.
Proc. Amer. Soc. Hort. Sci. 1950 : 56 : 381-88.

The inheritance of the above characters was analysed in a cross between the subspecies *sesquipedalis* and *cylindrica* of *V. sinensis*, represented by the horticultural varieties Yard Long and Lady Cream respectively. Climbing habit was dominant to bush habit and controlled by a single gene pair, *Tt*. Data are given on the quantitative inheritance of pod maturity, pod length, seed shape and size. In the case of pod length eight pairs of genes appear to be operative. Evidence was obtained of linkage of the gene *R* for basic colour, *Bu* for buff seed coat and *T* for growth habit with at least some of the multiple genes for quantitative inheritance. The following linkages were demonstrated: *T* and pod maturity; *R* and pod length; *Bu* and pod length; *R* and seed size (cf. Abst. 2164).

3136. CAPINPIN, J. M. and
REAÑO, M. C.
Inducing morphological variations in crop plants with poisonous plant extracts.
Philipp. Agric. 1949 : 32 : 305-11.

One polyploid plant of cowpea was obtained from seeds soaked in the root extract of *Rourea erecta* at the concentration of 1 part extract to 3 parts water. The polyploid was identified by increased stomatal size and delayed vegetative development.

3137. SACHS, E.
Bedeutung, langjährige Versuchsergebnisse, Anbaumöglichkeiten der Sojabohne. (**The importance, many years of experimental results, and possibilities of cultivation of soya bean**).
Landw. Jb. Bayern 1949 : 26 : No. 3/4 : 46-64

Experiments with soya bean have been in progress since 1915 at the Weißenstephan breeding institute in Bavaria; figures for yields of soya bean, rape and other oil plants show that the soya bean yields are more variable and the profit more doubtful, and further breeding work is necessary before soya bean can take the place in German agriculture which it deserves on account of its high nutritive value. By selection, advances of up to a month in earliness have been effected but it remains for the breeder to combine this earliness with higher yielding ability. Improvements in growth habit and freedom from virus disease are other desiderata.

3138. HOLMBERG, S.
Soybean trials in Sweden.
Soybean Digest 1950 : 11 : No. 2 : p. 13.

Although most imported varieties do not ripen early enough when grown in Sweden, short season hybrids are being developed at Fiskeby from crosses between varieties from northern Japan and others from northern Manchuria, North America and central Europe (cf. Abst. 2257).

3139.
Hybridizing beans a difficult art !
Soybean Digest 1950 : 10 : No. 4 : p. 38.

The method by which controlled cross pollinations of soya beans are effected is briefly described.

3140. SAUER, G. and
WIDJANARKO, S.
Gevlekt zaad bij witte kedelee-variëteiten. (**Mottled seed in white varieties of soya bean**).
Landbouw 1951 : 23 : 111-12.

Observations are reported on the occurrence of mottling of the seed coat of soya beans in Bogor, Indonesia. One variety Sumbing (No. 452) sown in the Tjikeumeuh selection garden produced two distinct classes of seed, one being pure white, and the other 100% mottled. Indications have been found that the soil and other environmental conditions may tend to induce mottling.

The writers will be glad to be informed of any cases of mottling in white-seeded varieties.

3141. CARTTER, J. L.
Development of new soybean varieties.
Soybean Digest 1950 : 10 : No. 5 : 13-15, 31.

An account is given of improved soya beans developed in the USA since 1943, supplemented by a map showing the varieties recommended for each state. Further increase in oil content is being sought but yield continues to be of greatest importance. Crosses made between CNS, possessing resistance to bacterial pustule, and agronomically desirable varieties have produced progenies from which promising resistant selections have been obtained.

3142. CALLAND, J. W.

Soybean research projects.

Soybean Digest 1950 : 10 : No. 5 : 34-40.

A survey of work under way at various experiment stations in the USA includes breeding for disease resistance, research on the inheritance of desirable characters and maturity studies.

3143. WEISS, M. G.

The soybean improvement program.

Soybean Digest 1950 : 10 : No. 11 : 34-35.

The improvements in USA soya bean production during recent years are directly related to the introduction of new varieties. Some of the principles on which future research will be based are outlined. They include prevention of any serious epidemics of soya bean diseases, other than blight, pustule and wildfire which are already under control, by investigating the inheritance of resistance and developing strains which will not be susceptible.

3144. HARTWIG, E. E. and

LEHMAN, S. G.

Inheritance of resistance to the bacterial pustule disease in soybeans.

Agron. J. 1951 : 43 : 226-29.

The resistance to bacterial pustule found in the soya beans CNS and FC 3192 is recessive and conditioned by a single pair of major genes. Differences in the degree of susceptibility of susceptible lines and the range of susceptibility shown by the progenies of crosses between such lines indicate that modifying genes influence the dominant allele.

3145. HOLSTON, E. M. and

CRITTENDEN, H. W.

Resistance in soybeans to root-knot nematodes.

Phytopathology 1951 : 41 : p. 562. (Abst.).

The relative resistance of ten soya bean varieties to *Meloidogyne incognita* var. *acrita* has been determined in field and greenhouse tests. The number of nematodes occurring in the apparently resistant Illini was as great as in the susceptible Chief; this indicates tolerance rather than true resistance in the former variety.

3146. HUMPHREY, L. M.

1949 variety test at Dortch Farms.

Soybean Digest 1950 : 10 : No. 5 : p. 32.

The results of trials of commercially established soya beans at Scott, Ark., are reported. Dortchsoy 2 and 31 have continued to outyield other varieties. Several varieties, including Dortchsoy 7, 31, 31A, 31B and Roanoake, showed a high degree of resistance to shattering.

3147. LAMPRECHT, H.

Koppelungsstudien im Chromosom V von *Pisum*. (Linkage studies in chromosome V of *Pisum*).

Agri Hortique Genetica, Landskrona 1950 : 8 : 163-84.

The linkages so far known in chromosome V are reviewed (cf. *Plant Breeding Abstracts*, Vol. XIX, Absts. 609 and 611), and, on the evidence from new crosses recorded here, the gene map for that chromosome is set out as:—

—Cp—16.5—Gp—10.5—Cr—18.2—Fs—21.6—Ast—

3148. LINDQVIST, K.

The mutant "micro" in *Pisum*.

Hereditas, Lund 1951 : 37 : 389-420.

Although most of the material derived from a mutant dwarf type, known as the micro line, which originated in the F_8 of a cross between Fürst Bismarck [Count Bismarck] and Grå dvärg [Grey Dwarf] is cytologically normal, one cross between Chiando and Acacia Microdwarf produced an F_1 hybrid in which two univalents of unequal size appeared at meiosis. It is thought that translocation of the greater part of the long arm of a chromosome with a subterminal centromere to the short arm of its homologous chromosome may have occurred.

An analysis of the F_2 generations of 14 crosses involving micro types has provided data concerning the recessive gene *lm*, which determines the micro growth habit, in dihybrid segregation with 17 other genes. With respect to the relationship between the micro type and other growth habits, *lm* is nonallelomorphic to *Le*, *Cy*₁ and *Cy*₂; by interaction with these genes *lm* produces the phenotypes designated microdwarf, microtall, microcryptodwarf and micros slender. Evidence is presented confirming linkage between *lm* and *P* in the *Wlo-P-Pl* group.

The possibility that two chromosomal segments carrying the genes *Lm-P* and *Le-V* have originated by duplication of an ancestral segment is discussed.

3149. LAMM, R.

Cytogenetical studies on translocations in *Pisum*.

Hereditas, Lund 1951 : 37 : 356-72.

Data concerning meiosis in hybrids between various prime types (cf. *Plant Breeding Abstracts*, Vol. VI, Abst. 1442) undergoing spontaneous translocations are presented.

Although Sansone (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2707) believes that two different translocations have arisen independently in the variety Extra Rapid, it is pointed out that structural type 4 may possibly be identical with prime type E (x-normal from N III).

Chromosomes 1 and 3 appear to be involved in interchanges in the hybrid D x C. Several lines of evidence suggest that the centromere of chromosome 1 is in the neighbourhood of the gene *Gp*. In chromosome 3, the centromere is probably situated in the *St-B* segment, thus explaining the reduction in crossing-over in the *St-B* segment of the prime type hybrid D x A compared with normal values in the C x A and E x A heterozygotes. In prime type E, one of the interchange chromosomes has a long interstitial segment, from which reduced cross-over values would be expected.

3150. LAMPRECHT, H. and

MRKOS, H.

Die Vererbung des Vorblattes bei *Pisum* sowie die Koppelung des Gens *Br*. (**The inheritance of the bracteole in *Pisum* and linkage of the gene *Br***).

Agri Hortique Genetica, Landskrona 1950 : 8 : 153-62.

In the course of a genetic analysis of the occurrence of bracteoles in intervarietal crosses of peas, the authors also obtained further information regarding linkage in chromosome IV (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 488).

Br showed linkage with the genes *Le* and *V* of chromosome IV, and though the position of *Br* in relation to *Td* is not yet certain, the following gene order is suggested for that chromosome: *N-Z-Fa-Br-Td-Le-V*. The gene *Con* (cf. *Plant Breeding Abstracts*, Vol. VIII, Abst. 1659) may also prove to be in chromosome IV.

3151. SOKOLOV, P. P.

(**A progress report of the Azerbaidžan Scientific Research Institute of Agriculture**).

Agrobiologija (Agrobiology) 1950 : No. 6 : 149-54. [Russian].

Breeding work with peas grown for seed, fodder and green manure for cotton is reported. The new varieties grown for seed are described. Variety 1508, from 469 x 555, is a hardy

small seeded variety yielding 24.4 c. seed and 70.1 c. green fodder per ha. The 1000 seed weight is 104.2 gm. The seed is mottled brown and has good cooking properties. The variety is almost free from *Bruchus* injury when planted in November. Variety 1528, from 487 x 469, differs little from 1508, except that its seed is smaller and white and that its cookability is slightly less satisfactory. Variety 8, derived from Viktoria Mahndorf, has large white seed. The 1000 seed weight is 336 gm. It is hardy and yields 21.5 c. seed and 4.12 c. green fodder per ha. The variety is more susceptible to *Bruchus* injury than 1508 and 1528. Variety 1508 is listed with other varieties grown for forage and ploughed in as green manure for cotton. These varieties include 468 and 565, which were bred for hardiness, earliness, and high yield of green matter. They are planted in September.

3152. WRIGHT, D. W.,
GEERING, Q. A. and
DUNN, J. A.

Varietal differences in the susceptibility of peas to attack by the pea moth, *Laspeyresia nigricana* (Steph.).
Bull. Ent. Res. 1951 : 41 : 663-77.

Variations in the susceptibility of six varieties, differing widely in date of maturity and haulm length, were determined from early and late sown trials at Harlow, Essex. Statistical analyses showed that the period of exposure to an active moth population and the amount of plant cover were closely associated, exerting a combined influence on the severity of the attack.

3153. HAGEDORN, D. J.
The reaction of Perfection-type peas to Wisconsin bean virus 2 isolates from pea.
Phytopathology 1951 : 41 : 494-98.

Data are presented concerning the reaction of 36 commercially grown Perfection type pea varieties to four Wisconsin isolates of bean virus 2 obtained from peas. Most varieties were resistant or rarely infected; eight were susceptible to at least one isolate. Crites-Moscow's Dark Green Perfection, Washburn-Wilson's Early Perfectah, Early Perfection and Perfection 1164 were susceptible to all four isolates (cf. Abst. 2279).

3154. TOMETORP, G.
Sortförsök med mörgr- och spritärter vid Alnarp 1943-1948. (Variety trials with marrow fat and shelling peas at Alnarp 1943-48).
Medd. Stat. Trädgårdsförsök 1951 : No. 62 : Pp. 36.
TOMETORP, G.
Första klass sortiment av mörgrarter. (First class assortment of marrow fat peas).
Försök och Forskning 1951 : 8 : p. 3.

The first report gives a fully detailed account of the performance of shelling and marrowfat varieties of peas in trials at Alnarp. The collection included some of the older first class varieties as well as new varieties. The following new dwarf marrowfats Continental/48, Hamund/48 and Ideal/48 were certified as first class.

The second article is a brief survey of the detailed report.

3155. BHAT, N. R. and
ARGIKAR, G. P.
A genetic linkage in *Cicer arietinum* L.
Heredity 1951 : 5 : 143-46.

A linkage value of 23.85% between the factor *U* for branching habit and *Al* for leaflet arrangement is reported. This is the first case of genetic linkage detected in *C. arietinum*. Possibly the factor *E* for early maturity is also linked with *U* and *Al*.

3156. BHATTACHARJEE, S. K.

Caryotype analysis of *Lens esculenta* Moench var. *microsperma*.

Sci. and Cult. 1951 : 16 : 426-27.

Figures and a detailed description are given of the chromosome morphology of *L. esculenta* var. *microsperma*.

3157. ŠEVČUK, T. N.

(For reintroduction and multiplication of local lentil varieties).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 8 :

51-55. [Russian].

Multiplication and improvement of Inžavinskaja, Petrovskaja and Mučkapskaja, productive local varieties formerly cultivated in the Tambov, Penza and Saratov provinces, are advocated. These varieties bear yields as high as Petrovskaja 4/105, the best of the cultivated varieties which have superseded them.

3158. POMOGAEVA, A. I.

(A new variety of table lentil).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 9 :

p. 74. [Russian].

Breeding work with lentils at the Petrovskaja State Breeding Station, Penza province, is reported. The most recently developed variety Penzenskaja 14 [Penza 14], which is still under trial, has larger seed and higher yielding capacity than Petrovskaja 4/105, the best variety bred previously at the institute and a standard in many provinces and republics of the USSR.

Penzenskaja 14 was bred from Petrovskaja 4/105 x Petrovskaja 5/15, the latter variety being remarkable for its large, uniform, pale green, nonvariegated seed. Penzenskaja 14 shows resistance to drought, lodging and diseases and has large, uniform, pale green seed. It outyielded Petrovskaja 4/105 in the trials conducted at the institute by 1.82 c. per ha., at the Čakinskaja State Breeding Station by 2.7 c. per ha., on varietal fields in the Voronež province by 5 c. per ha., in the Penza Province by 2.32 c. per ha. and the Tambov province by 1 c. per ha.

3159. TURNER, N.

Relation between sugar content of corn and infestation and survival of the European corn borer.

J. Econ. Ent. 1951 : 44 : 307-09.

At the Connecticut Agricultural Experiment Station results of investigations showed that there was no relationship between sugar content of numerous sweet corn hybrids and degree of infestation by larvae of the European corn borer, nor between sugar content and number of larvae surviving after harvest.

3160. VAARAMA, A.

Some chromosome numbers in the genera *Angelica*, *Ocimum*, *Satureja*, *Thymus* and *Cnicus*.

Arch. Soc. Zool. Bot. Fenn. "Vanamo" 1947 : 2 : 55-59.

Chromosome counts of species of the above genera were made at the State Horticultural Institute, Piikkiö, Finland, in connexion with trials of aromatic plants. The following numbers are reported: *A. Archangelica*, *A. sylvestris*, *A. ursina* and *A. pachycarpa*, $2n = 22$; *O. Basilicum*, $2n = 48$; *S. hortensis*, $2n = 45$; *S. montana*, $2n = 30$; *Th. pulegioides*, $2n = 28$; *Th. vulgaris*, $2n = 30$; *Th. citriodorus*, $2n = 42$; *Th. britannicus* and *Th. odoratissimus*, $2n = 54$; *Th. lanicaulis*, $2n = 58$; and *Cnicus benedictus*, $2n = 22$. *O. Basilicum* is considered to be a hexaploid species. The results indicate that polyploidy and aneuploidy have played an important part in the evolution of *Thymus* species.

BOOK REVIEWS

BACON, J. S. D.

The science of heredity.

C. A. Watts and Co., Ltd., London 1951 : 3s. 6d. : Pp. viii + 192. figs.
(Thinker's Library No. 139).

Many elementary introductions to genetics have appeared in recent years, one of the latest being Dr. Bacon's *Science of Heredity*. This appears to be written for readers with no previous knowledge of the subject nor even with any previous knowledge of biology. The exposition is accordingly rather in the style of a class instruction for the lower fifth, with abundant use of italics and quotes for emphasis.

After a vaguely historical introduction, Mendel's laws are presented, followed by the chromosome theory of inheritance and an introduction to biochemical genetics. Sex determination and polyploidy receive a brief treatment, and the book closes with an account of plant and animal breeding procedures, human genetics, in particular blood groups, and eugenics. On the latter topic, as on Lysenko's genetics, the author is cautious and restrained.

Dr. Bacon's book covers quite a wide field but the laborious style will not commend it to readers of average intelligence for whom preexisting texts are likely to prove more serviceable.

HURST, R.

What's all this about genetics?

C. A. Watts and Co., Ltd., London 1951 : 1s. Pp. 124. 6 figs.
(Thrift Books No. 3).

This is not an ordinary book on genetics. It is in some degree an eye-witness account of the birth of the youngest of the sciences. Its authoress is the widow of one of the pioneers of Mendelian genetics, C. C. Hurst, who had already put forward a view of discrete hereditary units before the work of Mendel came to light. A letter to Hurst from De Vries is quoted in which he writes: "You have had at Chiswick the kindness of telling me some figures you had won in crossing your *Berberis* species . . . and I should like very much to know in how far your experiments would confirm the law of Mendel. I think they do, and this would be a great success." The personal element introduced in this way makes the gradual unfolding of the story of the birth of Mendelism as absorbing as an adventure story or a running commentary of a social or athletic event. The whole is couched in lucid terms avoiding technical jargon, yet while being designed for the layman ignorant of genetics it is an authoritative, accurate and objective account, in miniature, of the position of genetics today. Even the newer issues such as Michurinism and the genetics of micro-organisms receive mention, though the importance of the latter in the more recent development of genetical theory does not emerge as strongly as perhaps it should; nor can the viewpoint that viruses are peripatetic genes, which seems to be suggested, be accepted without some reserve.

The book itself can be recommended unreservedly as an introduction to genetics and the *Thrift Books* commended for making this well-named series available at a shilling per volume.

COOK, R. C.

Human fertility: the modern dilemma.

William Sloane Associates, New York 1951 : \$ 4.50 : Pp. viii + 380.

"Malthus was right" is the central theme of this book; and very few readers of these glowing pages will have any doubt left as to the gravity of the crisis facing humanity if the present birth-rate trends are allowed to continue. Two distinct aspects of the trends are emphasized: firstly the purely quantitative, resulting largely from improved health measures and consequent fall in death rate; this has had the paradoxical consequence that in areas such as Puerto Rico and Japan the country is no longer able to feed or house the increased numbers and slums and grave nutritional deficiencies have resulted. The second serious

aspect is the qualitative one: in the USA the differential birth rate is such that in three generations the total population would more than double and 60% of the children produced would be descended from women with 0-7 years' schooling, 22% from the group with from 8 years' schooling to three years' high school, and only 18% from high-school and college graduates.

In the course of delivering this message Mr. Cook contrives to give a most graphic outline of the principles of evolution and genetics, the vicissitudes of Darwin and Mendel, studies of identical twins and even the genetics controversy in the USSR, showing the bearing of all these things on the present population crisis. Public authorities are thoroughly trounced for their lack of vision and initiative as the following extract will show:

"The age-old threat of the Malthusian controls of famine and disease balancing excess numbers hangs over every Asiatic country. Only four other alternatives are possible in Japan: (1) a program of continually expanding industrialization and commerce exceeding anything dreamed of before 1940; (2) continued and increasing subsidy by United States or other taxpayers to make up for the deficiency in food; (3) prompt and rigid control of population; (4) a miracle.

"The United States policy thus far has been to settle for the fourth alternative, with the second as a stopgap until the miracle occurs."

Mr. Cook is admirably equipped for the task he has set himself. He is the editor of the *Journal of Heredity*, a lecturer in genetics in the George Washington University and has had countless other activities in the fields of human heredity and population research which give him a vision of the wider implications of the problems with which he deals. He is also possessed of a trenchant and racy literary style and a deeply human concern for the helpless victims of the processes he describes in such vivid terms. The book cannot fail to arouse interest amongst wide circles of general readers and should be read by all who have any say in the shaping of our future society.

STUBBE, H.

Über den Selektionswert von Mutanten. (**The selection value of mutations**).

Akademie-Verlag, Berlin 1950 : DM 3.20 : Pp. 40. 2 figs. 29 tables.

This small volume of the proceedings of the section of agricultural sciences of the German Academy of Sciences in Berlin is devoted to a lecture given at the plenary session on 11 May 1950, in which the speaker described some of his researches on the garden antirrhinum and their bearing on the general problem of evolution, in particular the role of mutation in establishing new forms in nature.

Experiments were made on 16 different mutants of Strain 50 of *Antirrhinum majus* to estimate the various factors which condition their survival value in comparison with the original strain. Seed production in some of the mutants, such as *heroina* and *Victrix*, exceeded that of the original strain in some years, occasionally by as much as 100%; hybrids between some of the mutants also exceeded the original strain in seed production. Under certain circumstances it would appear therefore that the mutants would have a positive selection value and be capable of supplanting the original form. The superiority of the *Victrix* mutant is apparently conditioned by its greater resistance to rust (*Puccinia Antirrhini*).

GEORGE, T. N. •

Evolution in outline.

C. A. Watts and Co., Ltd., London 1951 : 1s. Pp. 126. 9 figs.
(Thrift Books No. 1).

In spite of its title, and the commendably modest price at which it is sold, this is not really a book for a beginner. Its style is heavy and academic, and it is full of technical terms and expressions which a reader new to the subject would almost certainly find alarming and often confusing. It seems more like a set of lectures on different aspects of evolution and as such can be recommended to students who are already familiar with the purely biological

aspect of the mechanism of evolution. For a connected story of what has happened, in the thousand million years or so during which organisms have been evolving or of how it has happened, the reader will look in vain, except for the descent of man himself, which is described rather more graphically than the rest in the final chapter on "Purpose and progress". The main merit of the book is its guarded nature, so that if it fails to give a vivid picture of how man and the modern world have gradually developed from the primeval speck of protoplasm, at least it does not give a false picture. "The rise and diversification of the different groups took place", we are told, "by a happy but quite fortuitous association of the right genes and the appropriate environment of selection. It is quite impossible to 'explain' primate evolution without taking both factors, which are mutually independent, into account."

SKOOG, F. (Editor)

Plant growth substances.

University of Wisconsin Press 1951 : \$ 6.00 : Pp. xiv + 476. figs. tables.

To celebrate the hundredth anniversary of the founding of the University of Wisconsin a symposium on plant growth substances was arranged. This volume contains 40 papers presented at the general meetings and discussions in September 1949. They are grouped together under the following headings: Plant growth substances; Growth substances in plant metabolism; Tissue responses to growth substances; Practical applications of growth regulators; Growth substances in vegetative development; Growth substances in reproductive development; Growth substances in pathological growth; and Vitamins and amino-acids as growth factors.

An important contribution which merits special mention is a paper by K. V. Thimann in which he suggests that auxins are substances which protect growth promoting enzymes from inhibitors. This hypothesis unites two hitherto unrelated aspects of the auxin studies: the role of auxins in metabolism and the chemistry of the active substances.

The practical applications of plant growth substances are many and various. P. W. Zimmerman lists 11 of them. Separate papers are devoted to the use of these substances as herbicides and in fruit production and tropical agriculture.

A paper of genetical interest is "Control of evolution and life processes in plants" in which A. F. Blakeslee discusses research on *Datura* in connexion with embryo culture and polyploidy. In papers by E. E. Snell and E. L. Tatum respectively the nutritional requirements of bacteria and fungi are discussed with reference to mutant strains. M.T.

ARNON, D. I. and

MACHLIS, L. (Editors)

Annual Review of Plant Physiology. Volume 2.

Annual Reviews, Inc., California 1951 : \$ 6.00 : Pp. 361. figs. tables.

The second volume of the *Annual Review of Plant Physiology* maintains the high standard of the first (cf. p. 716). It contains the following contributions: Mechanism of absorption and transport of inorganic nutrients in plants, by R. N. Robertson; the role of the mineral elements in plant nutrition, E. J. Hewitt; a critical survey of the physical background of photosynthesis, J. Franck; the kinetics and chemistry of photosynthesis, H. Gaffron and E. W. Fager; Biosynthesis of chlorophyll and related pigments, S. Granick; Respiration (the Pasteur effect in plants), J. S. Turner; Formation, occurrence, and inactivation of growth substances, P. Larsen; Herbicides and selective phytotoxicity, G. E. Blackman, W. G. Templeman, and D. J. Halliday; nutritional requirements of isolated plant tissues and organs, P. R. White; Frost, drought, and heat resistance, J. Levitt; experimental morphogenesis in vascular plants, R. H. Wetmore and C. W. Wardlaw; gas damage to plants, M. D. Thomas; and Permeability, by H. B. Steinbach. Of particular interest to the plant breeder is the review by J. Levitt on resistance to frost, drought and heat, examining literature published during the last ten years on the nature of resistance and methods of measuring resistance in crops and other plants and giving some attention to varietal studies and genetical aspects.

FRANCK, J. and
LOOMIS, W. E. (Editors).

Photosynthesis in plants. A monograph of the American Society of Plant Physiologists.

Iowa State College Press, Ames, Iowa 1950 : \$ 7.00 : Pp. viii + 500.
figs. tables.

The 22 papers included in this monograph have been contributed by plant physiologists working in various parts of the United States and cover the main aspects of recent research on photosynthesis, including the influence of external factors, the reactions which occur and the substances which are built up, quantum efficiency and the properties of chlorophyll and the chloroplasts. Some of the articles, such as J. H. C. Smith's "Products of photosynthesis" and "The relation of the fluorescence of chlorophyll to photosynthesis" by J. Franck are reviews; others, for example, W. Arnold's paper on colorimetric determination of the quantum yield, are firsthand accounts of original research.

There are four articles on tracer research, a subject of special interest because it is still comparatively new and is such a useful tool for investigating chemical and physiological processes. M. D. Kamen reviews the early experiments in the application of tracer methods to the study of photosynthesis as well as presenting some previously unpublished results. Another paper deals with the use of radioactive carbon, C^{14} , in investigations at the University of California, and the other two describe tracer experiments carried out at the University of Chicago.

The evolution of photosynthetic ability is discussed in an article on the comparative biochemistry of photosynthesis by C. B. van Niel, who points out that if life on the earth began in the presence of organic chemicals and not in a strictly mineral environment as is usually assumed, the first organisms need not have had great synthesizing ability: synthetic mechanisms could have developed gradually.

Together, the contributions of the various authors comprise an authoritative and reasonably comprehensive account of a subject which cannot fail to be of great interest to biologists.

M.T.

JOHANSEN, D. A.

Plant embryology. Embryogeny of the spermatophyta.

Chronica Botanica Co., Waltham, Mass., and Wm. Dawson and Sons, Ltd., London 1950 : \$6.00 (special bound edition \$14.00) : Pp. xvi + 305. 80 figs.

In his *Plant Embryology*, Dr. Johansen has assembled an extremely valuable body of data on the post-fertilization development of the zygote in gymnosperms and angiosperms. The book is arranged systematically, the author, after a brief historical survey, plunging straight into the gymnosperms, pausing thereafter for a while to outline what he describes as the fundamental laws of embryonomy in the angiosperms, before dealing family by family with the angiosperms.

The value of such a comprehensive survey of a subject of such technical difficulty, and the basic papers on which are extremely scattered, is very great. The exact weight that should be allowed to embryology in, say, taxonomic comparison is a matter for some dispute; few however would deny its importance in any comprehensive study of plant relations.

It is rather difficult to assess the theoretical significance of Dr. Johansen's treatment, since preoccupation with the detailed facts leaves the author with little time for aught else. The general principles, however, enunciated in chapter XVI seem a trifle overformalized, though the reduction to a type of algebra of the course of cleavage of the zygote appears elegant and helpful.

The author is rather inclined to regard embryological differences as sufficiently important to establish systematic distinctions in doubtful cases, as in the subdivision of the Cupressaceae. One would like to know how far a comparatively uniform adult morphology can coexist with embryological diversity.

Embryological development in the angiosperms is classified under six major types, each of which is subdivided into a series of less rigidly defined variations, for example, the zygote in

the grass is said to cleave according to the *Poa* variation of the Asterad type. It is on the value of this classification that Dr. Johansen's treatment will have to be judged. It is in many ways a highly logical analysis, which is its strength. What is not so clear is whether the differences so recognized correspond with other taxonomic criteria. One is impressed with whole families or related families coming under a single type and variation; but one is less easy about the few species investigated with sufficient care to be classifiable, about the distant taxonomic relations of several families coming under the same embryological category, and about the different embryological categories of such closely related genera as *Geranium* and *Erodium*, or within such morphologically uniform genera as *Trifolium*. Dr. Johansen's categories cut right across the traditional subdivision of the angiosperms into dicotyledons and monocotyledons, with which he is not impressed. It will be interesting to see whether further studies will support this stimulating feat of iconoclasm.

STOVER, E. L.

An introduction to the anatomy of seed plants.

D. C. Heath and Co., Boston and G. G. Harrap and Co., Ltd., London
1951 : \$4.00. Pp. xiii + 274. 149 figs.

It is difficult to present an account of the anatomy of higher plants that is anything but a catalogue of rather disconnected observations, this being the state of plant anatomy to-day. In recent years, Eames and MacDaniels' *Introduction to Plant Anatomy* has been widely adopted as the standard text book on the subject; Professor Stover's new book is not likely to replace its predecessor but it provides an eminently readable supplement to it.

The groups treated are the living gymnosperms and the angiosperms, the emphasis being rather on the dicotyledons. The author begins with the embryo, then works his way up from the root to the leaves and stem. Vegetative propagation is given a chapter to itself, while the three final chapters deal with the structure of wood.

The author is inconvenienced rather by the divergent anatomy of the gymnosperms, which might perhaps have been better treated apart, rather than interlarded with angiosperms. The text in general is lively and succinct with about the right degree of discursiveness. The terminology is up to date, and we find "water tube" replacing the more biblical sounding "vessel".

Revolutionary departures from the stereotyped ways of treating anatomical questions are not to the author's taste. There are grave discussions as to what is and what is not a hypocotyl, and anatomical categories in general are discussed as though they represented fairly definite actually existing entities.

Professor Stover's introduction is a most useful addition to the literature on the subject, calculated to convey a maximum of anatomical information to the reader without undue stimulation of his critical faculties.

FISHER, R. A.

The design of experiments.

Oliver and Boyd, London and Edinburgh 1951 : 6th ed. : 12s. 6d. Pp. xv + 244. 5 figs. 39 tables.

The principal addition which has been made to this book in the new edition (cf. p. 448) is interesting and valuable, and thoroughly characteristic of the author. Having introduced the notion of "interaction" of factors in agricultural experiments, and having previously discussed the analysis of multiple trials carried out at different places and times, using treatment-place and treatment-time interactions, he now finds it necessary to clarify the differences in logical status between the different sorts of categories in a factorial analysis, doubtless because of the extensive use that has been made of such analyses in industrial and other experimentation. This he does by an addition to §65, in which he distinguishes between definite and indefinite categories, and shows that the interaction of a definite with an indefinite category is necessarily indefinite. His remarks on the nature of the inferences which can legitimately be drawn from experimenting on a number of farms over a series of years should be read with care by all who have similar problems to face in experimentation generally.

J.W.

KLOSE, N.

America's crop heritage. The history of foreign plant introduction by the Federal Government.

Iowa State College Press, Ames, Iowa 1950 : \$3.50 : Pp. x + 156. plates. tables.

Most of the important economic crops which are grown in the United States have been introduced at some time or other from foreign countries. In this book the author gives an account of their introduction and distribution, with particular emphasis on the work of the federal government. The story starts with Christopher Columbus and continues up to the present day. It is well told and will appeal to the general reader as well as to those with a special interest in plant introduction. Not only food crops but fibres and other economically important plants, including forest trees, are referred to. There are maps, tables and photographs to illustrate the text. Bibliographies are given at the ends of the chapters and an index is also provided.

M.T.

HITCHCOCK, A. S. and

CHASE, A. (Reviser)

Manual of the grasses of the United States.

Misc. Publ. U.S. Dep. Agric. 1951 : No. 200 : 2nd ed. : Pp. 1051. 1200 figs. (price \$3.00).

The revised edition of this well known work is arranged upon similar lines to the first edition, published in 1935 (cf. *Plant Breeding Abstracts*, Vol. V, p. 375). An appendix lists the additions to or changes from the genera appearing in the first edition.

VASCONCELLOS, J. DE CARVALHO E, and

TÉLLEZ MOLINA, R.

La planta de trigo. Morfología y fisiología. (**The wheat plant.****Its morphology and physiology).**

Inst. Nac. Invest. Agron., Minist. Agric., Madrid 1950 : 60 ptas.

Pp. xi + 201. 80 figs.

In 1945 Professor João de Carvalho e Vasconcellos published a monograph on the wheat plant entitled *A vida do trigo* (*The life of the wheat plant*), which described the morphology and anatomy of the wheat plant in all its main developmental phases. The monograph, written in Portuguese, was published by the Federação Nacional dos Produtores de Trigo [National Federation of Wheat Producers] in Lisboa and did not achieve wide circulation among specialists in the subject. A Spanish translation of the work has been made by Ing. R. Téllez Molina and is here published, with a number of amplifications and additions by the translator, who is himself a specialist in the study of wheat systematics and genetic improvement.

The first part comprises a description of the anatomy of the wheat grain, its chemical composition and germination, followed by descriptions of the young seedling and its various organs. Chapter 2 is devoted to the physiology of the root and leaf, chapter 3 to tillering and the effect of various environmental factors upon it. The main seedling diseases are described in chapter 4. There follows a series of chapters giving similar information for the adult plant and a third series for the plant at maturity, and the volume terminates with a selected bibliography and an index.

WEAVER, J. C.

American barley production. A study in agricultural geography.

Burgess Publishing Company, Minneapolis 1950 : \$3.00 : Pp. ii + 115. 51 figs.

A preliminary section dealing with the origin and early development of barley cultivation in the Old World and the introduction of barley to the American Colonies provides an adequate preamble to the sequence of distribution maps, well supported by a readable text, tracing the expansion of the barley growing regions of the United States from 1839 to 1939 and in the subsequent decade. Geographical distribution is recorded effectively by

indicating acreage with a small dot for each 1000 acres and bushel yield per acre by isopleths; added emphasis is given in this way to the gradual changes. A chapter concerning the ecological factors related to present areas of barley cultivation appears to be sandwiched between two chronological sections, but an omission of these considerations would have been regrettable. There is no mention of changes in the relative popularity of different barleys or of the varieties grown at any time during the period surveyed.

ANDREWS, W. B. (Editor)

Cotton production, marketing and utilization.

W. B. Andrews, State College, Mississippi 1950 : \$4.50. Pp. 476.
figs. tables.

This book, representing the combined efforts of 15 authors, is designed to interest those who are directly concerned with the various aspects of cotton growing in America, and its subsequent handling by the industry. It is hoped, particularly, to encourage the most efficient practices in both production and utilization of cotton.

There are sixteen chapters covering the various aspects of the subject, of which seven deal with the cotton plant itself. In general the respective authors have attempted to summarize the information on their special part of the cotton industry and this is, in most cases, as effective as can be hoped for within the space limits available.

On the biological side the chapters, in order, deal with "Shifts in Cotton Production," "Varieties and breeding," "Response to fertilizers", "Diseases", "Cultural practices", "Insects", and "Harvesting". On the technical side the book goes on to deal with machine harvesting, ginning, warehousing, classing, marketing, milling, trading, and the allied matters of the fibre technology, and cotton seed. Thus a great number of important subjects are tackled within the limits of this single book and it is due to this limitation that the book disappoints.

The styles of writing differ and particularly the ease of reading. If one may mention an example, the chapter on "Response to fertilisers" illustrates an unfortunate tendency found in several of the chapters. The blunt style, with short sentences, makes for difficulty in reading, and splits the subject matter into a series of bald statements, at times remarkably unqualified, at others very obvious.

The use of a heavier print to give prominence to the first sentence, or part of a sentence, in each paragraph is a mixed blessing. These sentences often summarize the material mentioned in the succeeding ones, but there are so many instances where this is not so, that the habit is an unhelpful intrusion of editorial style. If these remarks seem rather critical, it is because these unfortunate points detract from a book that could so easily have been more readable without any loss of effectiveness. In fact a more agreeable style would have made the book an interesting one for others than those actually involved in the industry.

It seems a pity that the material was not made into two volumes—one biological and one on the technology and marketing side. In this way the severe handicaps would have been reduced and the authors could have done ample justice to such a huge array of subjects, giving the extra explanation that would have greatly extended the usefulness of the book. In spite of all this, one must still acknowledge with gratitude the work that has been put into this valuable book, for it does represent a review of the whole cotton industry in America.

G.E.D.

GAROGLIO, P. G.

Tecnología de los aceites vegetales con especial referencia al aceite de oliva. II. El aceite de oliva y su industria. (**Technology of vegetable oils with special reference to olive oil. II. Olive oil and the olive oil industry**).

Ministerio de Educación, Universidad Nacional de Cuya, Mendoza (República Argentina) 1950 : Pp. 1377. figs. tables.

The second volume of this encyclopedic work (cf. p. 720) has now appeared. It begins with a chapter on the origin of the olive, its cultivation and its utilization. The second chapter

is devoted to the statistics of olive oil production in different countries, and the olive varieties grown in the various regions of these countries are described, with illustrations. Chapter 3 deals with the taxonomy of the genus *Olea*, the geographical distribution of the species, methods of propagation and cultivation, diseases and their control. The fourth chapter describes the fruit, its construction, gathering, storage and composition; the fifth deals with table olives and their varieties, and the remainder are devoted to the extraction and utilization of the oil and by-products. The volume ends with a bibliography covering 36 pages, and author and subject indexes to the two volumes.

NEW JOURNALS

Acta Agronomica

According to the introduction announcing the publication of this Hungarian journal, a new chapter in the history of Hungarian science has begun and "the scientists of Hungary endeavour in every way to serve the cause of the working people and with their research work to help in the creative task of building socialism".

The table of contents comprises: (a) two articles in French, one on rice blast with special reference to Hungary, by J. Szirmai, and the other on ruderal weed associations in Hungary and their agricultural significance, by G. Ubrizsy; and (b) two Russian articles, one by G. Reichart on *Anthonomus pomorum* L., and another by A. Somos on Russian agricultural methods as an aid to vegetable growing (cf. Abst. 3108).

Indian Farming

Indian Farming appears in a new form, designed primarily for the farmer rather than for those merely interested in agriculture. It is hoped that the farmers themselves will contribute information regarding problems of general interest, thus helping to develop a magazine of practical value. The articles are of a popular nature with many illustrations.

Pakistan Journal of Forestry

The Pakistan Journal of Forestry has been created to overcome the shortage of space available in other forestry journals for discussion, in English, of the many problems relating to forestry in Pakistan. It is issued quarterly at 12 rs. or 30 shillings per year; further information can be obtained from the Editor, Pakistan Journal of Forestry, P.O. Upper Topa, Murree Hills.

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